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OF THE

STATE OF NEW YORK.

ONE HUNDRED AND TWENTY-THIRD SESSION.

1900.

VOL. XV.—66 TO 68, INCLUSIVE.

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New York State Agricultural Society,

AND ANNUAL REPORT OF

New York Bureau of Farmers' Institutes,

FOR THE YEAR 1899.

INCLUDING TRANSACTIONS OF THE

New York State Dairymen's Association,

FOR THE YEAR 1899.

TRANSMITTED TO THE LEGISLATURE MARCH 2, 1900.

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PART I.

STATE OF NEW YORK.

No. 66.

IN ASSEMBLY,

MARCH 2, 1900.

ANNUAL REPORT

OF THE

NEW YORK STATE AGRICULTURAL SOCIETY.

STATE OF NEW YORK:

ALBANY, N. Y., *March* 2, 1900.

Hon. S. FREDERICK NIXON, *Speaker of Assembly:*

SIR—I herewith transmit to the Legislature the Fifty-ninth Annual Report of the New York State Agricultural Society, and the abstracts and documents accompanying the same.

Very respectfully yours,
JAMES B. DOCHARTY,
Corresponding Secretary.

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OFFICERS FOR 1900.

President.

Hon. TIMOTHY L. WOODRUFF	Brooklyn, Kings

Vice-Presidents.

First District	Mr. F. M HEXAMER, New-York, New York.
Second District	Mr. E. B. LONG, White Plains, Westchester.
Third District	Mr. H. S. AMBLER, Chatham, Columbia.
Fourth District	Mr. PHILIP KECK, Johnstown, Fulton.
Fifth District	Mr. P. W. CULLINAN, Oswego, Oswego.
Sixth District	Mr. GEO. S. McCANN, Elmira, Chemung.
Seventh District	Mr. FRANK M. PARSONS, Weedsport, Cayuga
Eighth District	Mr. ALBERT E. BROWN, Batavia, Genesee.

Corresponding Secretary.

Mr. EDWARD A. CALLAHAN	Albany

Recording Secretary.

Mr. JAMES B. DOCHARTY	Albany.

Treasurer.

Mr. E. A. DURANT	Albany.

Executive Board.

Mr. EDWARD VAN ALSTYNE	Kinderhook, Columbia.
Mr. J. H. DURKEE	Sandy Hill, Washington.
Mr. JOHN H. FARRELL	Albany, Albany.
Mr. FRANK D. WARD	Batavia, Genesee.
Mr. P. K. DEDERICK	Albany, Albany.
Mr. O. J. LEWIS	Schodack Center, Rensselaer.
Mr. W. B. JONES	Albany, Albany.
Mr. HENRY VAN DRESER	Cobleskill, Schoharie.

Ex-Presidents.

Mr. W. A. WADSWORTH	Geneseo, Livingston.
Mr. JAMES WOOD	Mt. Kisco, Westchester.
Hon. J. B. DUTCHER	Pawling, Dutchess.
Prof. I. P. ROBERTS	Ithaca, Tompkins.
Hon. BENJ. F. TRACY	New York City.
Hon. ROSWELL P. FLOWER	Watertown, Jefferson.

State Agricultural Rooms.

The office of the society is in Agricultural Hall, corner of State and Lodge Streets, Albany.

CONSTITUTION.

The style of this society shall be "The New-York State Agricultural Society." Its object shall be to improve the condition of agriculture, horticulture, the household and mechanical arts.

§ 1. The society shall consist of such citizens of the state as shall signify in writing their wish to become members, and shall pay, on subscribing, not less than one dollar, and annually thereafter one dollar; and also of honorary and corresponding members. The presidents of county agricultural societies, or a delegate from each, shall, ex officio, be members of this society. The payment of ten dollars, or more, as fixed by the executive board, shall constitute a member for life, and shall exempt the donor from annual contributions.

§ 2. The officers of the society shall consist of a president, eight vice-presidents, one to be located in each judicial district, a recording secretary, a corresponding secretary, a treasurer, and an executive committee of eight additional members. The executive board shall consist of the officers above named, and five of the ex-presidents whose term of office has last expired, of whom eight shall constitute a quorum.

§ 3. The president shall preside at all meetings of the society and of the executive board, when present. In his absence a vice-president shall be named by the meeting for that occasion.

§ 4. The recording secretary shall keep the minutes of meetings of the society. The corresponding secretary shall carry on the correspondence with other societies, with individuals, and with the general public, in the furtherance of the objects of the society.

The treasurer shall keep the funds of the society, and disburse them on the order of the president or the chairman of the finance committee, countersigned by the corresponding secretary, and shall make a report of the receipts and expenditures at the annual meeting in January. He shall give bonds in the sum of $15,000 for the faithful performance of his duties.

The executive board shall transact the general business of the society, and shall take charge of and distribute or preserve all seeds, plants, books, models, etc., which may be transmitted to the society; and shall also have charge of all communications designated or calculated for publication, and, so far as they may deem expedient, shall collect, arrange and publish the same in such manner and form as they shall deem best calculated to promote the objects of the society.

§ 5. There shall be an annual meeting of the society on the third Wednesday in January, in the city of Albany, at which time all the officers shall be elected by a plurality of votes, and by ballot, with the exception of the five ex-presidents. The executive board shall have power to fill any vacancies which may occur in the offices of the society during the year. Extra meetings of the society may be convoked by the executive board, and fifteen members shall be a quorum for the transaction of business. No person shall be qualified to vote at any election of officers of the society, unless he shall have been a life member of the society for at least thirty days prior to such election, or be an ex-officio member from a county society, and no salaried officer of this society shall solicit or obtain proxies, either in his name or the name of another, to be used directly or indirectly to secure his re-election or to control the choice and election of his successor.

§ 6. The society shall hold an annual cattle show and fair on its present grounds near the city of Syracuse, to begin on the first Thursday in September and continue until 3 o'clock p. m. of the succeeding Thursday, unless the executive board by a two-thirds vote of those present, and voting, name and publish some other longer or shorter time, or some date for holding said fair.

§ 7. Neither the president, vice-president nor any other member of the executive board, except the corresponding secretary and treasurer, shall receive any pecuniary compensation for any services rendered to or for the society, by them or either of them.

§ 8. The constitution may be amended by vote of two-thirds of the members attending any annual meeting, upon one year's previous notice in writing.

EX-PRESIDENTS AND THE PLACES OF THE FAIRS.

Year.	Name.	Place of Fair.
1841	Joel B. Nott *	Syracuse.
1842	James S. Wadsworth *	Albany.
1843	James S. Wadsworth *	Rochester.
1844	John P. Beekman *	Poughkeepsie.
1845	Benjamin P. Johnson *	Utica.
1846	John M. Sherwood *	Auburn.
1847	George Vail *	Saratoga.
1848	Lewis F. Allen *	Buffalo.
1849	John A. King *	Syracuse.
1850	Ezra D. Prentice *	Albany.
1851	John Delafield *	Rochester.
1852	Henry Wager *	Utica.
1853	Lewis G. Morris *	Saratoga.
1854	William Kelly *	New York.
1855	Samuel Cheever *	Elmira.
1856	Theodore S. Faxton	Watertown.
1857	Alonzo S. Upham *	Buffalo.
1858	William G. McCoun *	Syracuse.
1859	Abraham B. Conger *	Albany.
1860	Benjamin N. Huntington *	Elmira.
1861	George Geddes *	Watertown.
1862	Ezra Cornell *	Rochester.
1863	Edward G. Faile *	Utica.
1864	James O. Sheldon	Rochester.
1865	Theodore C. Peters *	Utica.
1866	John Stanton Gould *	Saratoga.
1867	Marsena R. Patrick *	Buffalo.
1868	Thomas Hall Faile *	Rochester.
1869	Samuel Campbell *	Elmira.
1870	Solon D. Hungerford *	Utica.
1871	Richard Church	Albany.

Year.	Name.	Place of Fair.
1872	Milo Ingalsbe *	Elmira.
1873	Benjamin F. Angel	Albany.
1874	Harris Lewis *	Rochester.
1875	Alexander S. Diven	Elmira.
1876	Edwin Thorn *	Albany.
1877	Patrick Barry *	Rochester.
1878	George W. Hoffman	Elmira.
1879	Horatio Seymour *	Utica.
1880	N. Martin Curtis	Albany.
1881	Robert S. Swan *	Elmira.
1882	John D. Wing	Utica.
1883	George F. Mills *	Rochester.
1884	William M. White	Elmira.
1885	James W. Wadsworth	Albany.
1886	James McCann	Utica.
1887	James Geddes *	Rochester.
1888	W. A. Wadsworth	Elmira.
1889	James Wood	Albany.
1890	James Wood	Syracuse.
1891	O. B. Potter *	Syracuse.
1892	O. B. Potter *	Syracuse.
1893	J. B. Dutcher	Syracuse.
1894	J. B. Dutcher	Syracuse.
1895	I. P. Roberts	Syracuse.
1896	I. P. Roberts	Syracuse.
1897	Benj. F. Tracy	Syracuse.
1898	Benj. F. Tracy	Syracuse.
1899	Timothy L. Woodruff	Syracuse.

---

* Deceased.

LIFE MEMBERS.

A

Abbott, Edward A., Boston, Mass.
Abbott, Samuel J., 28 North Knox st., Albany.
Abell, Flavel A. Solvay.
Acker, Milo M., Hornellsville.
Acker, Victor A., Shelby Centre.
Acker, Victor A., Jr., Shelby Centre.
Adams, C. Kendall, Ithaca.
Adams, Ira S., East Aurora.
Adee, Fred W., New York.
Adee, Philip H., New York.
Akin, John W., Scipio.
Akin, Elwood S., Scipio.
Aldrich, A. E., Syracuse.
Aldrich, B. S., Syracuse.
Alexander, W. A., Scipioville.
Allen, Gordon W., Auburn.
Allen, C. L., Floral Park.
Allen, E. M., Syracuse.
Allen, I. W., East Syracuse.
Allen, William J., Heuvelton.
Alvord, Henry E., Dep't Agriculture, Washington, D. C.
Ambler, Henry S., Chatham.
Ames, D. T., Syracuse.
Amos, Jacob, Syracuse.
Amsdell, George I., Albany.
Amsdell, T. M., Albany.
Anderson, Lucius, Syracuse.
Andrews, Frank H., Syracuse.
Andrews, J. M., Syracuse.
Andrews, T. E., 306 W. Water st., Syracuse.
Andrews, Charles D., 1947 W. Fayette st., Syracuse.
Andrews, W. R., Fairmont.
Andrus, W. P., Rochester.
Angel, Benjamin F., Geneseo.
Annis, J. Rathbon, Albion.
Anthony, A. G. (M. D.), Warners.
Appleton, Francis H., West Peabody, Mass.
Archer, George W., Rochester.
Arnold, B. G., New York.
Arnold, William A., 603 Irving ave., Syracuse.
Armstrong, C. M., Homer.
Armstrong, Thomas, Plattsburgh.
Ashley, Charles, Ogdensburg.
Atherton, Edward D., Syracuse.
Atkinson, William, Syracuse.
Atwater, Dwight, Elmira.
Auer, M., Syracuse.
Averell, William J., Ogdensburg.
Averill, Charles S., "The Yates," Syracuse.

B

Babcock, Hiram W., Fleming.
Babcock, Isaac H., Lockport.
Babcock, John D., Syracuse.
Babcock, Samuel D., New York.
Babcock, S. B., Fairmount.
Bachtold, John, Syracuse.
Backus, Rufus N., Palmyra.
Badger, H. M., Elmira.
Bagg, James L., Syracuse.
Bailey, Isaac H., New York.
Bain, Alonzo, Kennedy.
Baird, David, Springfield Centre.
Baker, Aug. D., Aurelius.
Baker, Aaron Y., Hammondsport.
Baker, B. F., Burnt Hills.
Baker, Fisher A., Yonkers.
Baker, Hiram, Cicero.
Baker, Hiram W., North Syracuse.
Baker, John H., Aurelius.
Baker, L. A., 306 W. Genesee st., Auburn.
Baker, I. V., Jr., Comstock's Landing.
Baldwin, Anson, Yonkers.
Baldwin, B. F., Albion.
Ball, Calvin S., Syracuse.
Banks, A. Bleecker, Albany.
Banks, John, Bainbridge.
Banning, Walter E., Syracuse.
Bannister, Henry W., Syracuse.
Barbey, James J., Syracuse.
Barclay, Robert C., 17 W. 48th st., New York.
Barker, Louis J., Syracuse.
Barlow, A. G., North Ridgway.
Barlow, E. D., North Ridgway.
Barnard, Charles E., Utica.
Barnes, George M., Syracuse.
Barnett, Abraham, Albany.
Barney, C. S. (M. D.), Milford.
Barnum, W. S., Syracuse.
Barrett, James R., Cazenovia.
Barrus, E. R., Liverpool.
Barry, Thomas G., New York.
Barry, William C., Rochester.
Bassett, Charles B., Walton.
Batcheler, Geo. S., Saratoga Springs.
Batten, George, 38 Park Row, New York.
Baumgras, Julius, Syracuse.
Beach, G. A., Medina.
Beckwith, Dwight S., Albion.
Belden, James J., Syracuse.
Belden, A. J., Syracuse.
Belden, J. M., Syracuse.
Beley, Fred., Syracuse.

Bell, David K., West Brighton.
Benedict, Thomas E., Ellenville.
Benham, E. M., Hopewell Centre.
Benham, Murray, Hopewell Centre.
Benham, A. B., Dryden.
Bennett, James O., Belle Isle.
Bennett, J. B., Camillus.
Bennett, Miles C., Big Flats.
Bennett, J. M., Weedsport.
Bentley, Henry J., Horseheads.
Best, William L., Ogdensburg.
Betts, Samuel T., Syracuse.
Bibbins, W. S., Weedsport.
Bibbins, J. W., Weedsport.
Bicknell, J. Y., Buffalo.
Bidleman, Charles, Albion.
Bigelow, Otis M., Baldwinsville.
Bill, James R., Ogdensburg.
Billington, B. H., Syracuse.
Bingham, R. M., Rome.
Binsse, Louis E., New York.
Birge, James C., Heuvelton.
Bisdell, E. L., Baldwinsville.
Bishop, George A., Janesville.
Bissell, George N., White Plains.
Black, J. W., Syracuse.
Blanchard, J. H., Buffalo.
Blessing, Fred. S., Slingerlands.
Blunck, A. E., Johnstown.
Blust, Charles, Syracuse.
Blodgett, F. H., Syracuse.
Boardman, H. E., Rochester.
Bogert, M. D., Blainesville, Neb.
Bogue, Nelson, Batavia.
Bondy, Joseph, Syracuse.
Bonta, F. M., Syracuse.
Bostock, E., New York.
Boughton, Chauncey, Waterford.
Bowditch, Edward, Albany.
Bowe, J. C., Syracuse.
Bowen, H., Medina.
Bowen, Henry C., Brooklyn.
Bowen, Franklin, Highland.
Bowen, J. M., Weedsport.
Bowen, O. F., West Lowville.
Bowen, Walter, Flushing.
Boyce, Keer, Flushing.
Boyce, Guy, Syracuse.
Boyce, William, New York.
Boyd, W. B., Solvay.
Boyington, H. H., Brewerton.
Bradford, William, New York.
Bradley, George C., Watertown.
Bradley, W. C., Syracuse.
Bradley, C. C., Syracuse.
Bradley, George H., Lake Road.
Brandow, A. S., Albany.
Brayton, W. C., Syracuse.
Breed, Eugene, Memphis.
Breed, C. H., Medina.
Brees, William, DeKalb.
Breese, Henry G., Hoosick.
Breese, Ira V., Horseheads.
Breese, Ulysses, Horseheads.
Breese, Wellington E., Horseheads.
Brewster, S. Edward, Rochester.
Bridge, S. D., Canton.
Briggs, A. J., Moscow.
Briggs, George B., New York City.
Briggs, E. W., Medina.
Brill, Gerow D., Poughquag.
Brisbin, C. E., Schuylerville.
Bristol, Lewis M., DePeyster.
Bristol, Wheeler H., Owego.
Britton, Israel E., Syracuse.
Brodie, Hugh, Rural Hill.
Brodie, William A., Geneseo.
Bronson, S. M., Marcellus.
Brooker, John B., Hammond.
Brower, F. C., Syracuse.
Brown, Albert E., Batavia.
Brown, Alexander, New York.
Brown, Almer J., Jeddo.
Brown, Clarence G., Syracuse.
Brown, George D., Syracuse.
Brown, George H., Sharon, Conn.
Brown, Homer J., Hartford.
Brown, Jacob, 422 Westcott street, Syracuse.
Brown, Jacob, 610 Comfort street, Syracuse.
Brown, Jacob, East Syracuse.
Brown, James P., Utica.
Brown, James H., Holland Patent.
Brown, Josiah K., Holland Patent.
Brown, Jesse, Jr., Jamaica.
Brown, John, Webb's Mill.
Brown, J. Carter, Providence, R. I.
Brown, John Brosby, New York.
Brown, J. Emery, Oneida.
Brown, Lewis B., New York.
Brown, L. Harris, North Syracuse.
Brown, Lewis M., 145 West Fifty-eighth street, New York.
Brown, Sidney, Ogdensburg.
Brown, William Smith, New York.
Bruen, Alexander M., Scarsdale.
Brundage, A. C., Bath.
Bryce, William, New York.
Bryden, Robert, New Hartford.
Buchanan, Charles J., Albany.
Buckley, Thomas, Albany.
Buckley, Wade, Port Jervis.
Budd, S. Emory, Newark.
Burbank, George W., Binghamton.
Burch, H. M., New York.
Burden, I. Townsend, Troy.
Burden, James A., Troy.
Burdick, Orrin H., Auburn.
Burkhalter, Charles, New York.
Burlew, James B., Union Springs.
Burn, M. T., Tilsonburg, Ontario, Canada.
Burnhans, H. N., Syracuse.
Burns, William, 407 Tallman street, Syracuse.

Burns, Willis B., Syracuse.
Burr, J. H. Ten Eyck, Cazenovia.
Burr, William M., Cazenovia.
Burrill, H. L., Weedsport.
Burritt, O. W., Weedsport.
Busbey, Hamilton, New York.
Butler, E. K., Syracuse.
Butterfield, Daniel, New York.
Butterfield, John, Jr., Utica.
Button, R. D., Cotton's.
Butts, George, Manlius.

C

Cady, Charles, Auburn.
Cady, John E., Freeville.
Caldwell, Fordyce S., Brooklyn.
Caldwell, J. Wallace, Brooklyn.
Caldwell, William, 815 E. Genesee street, Syracuse.
Callahan, Edward A., "Country Gentleman," Albany.
Cameron, R. W., New York.
Camman, Herman H., New York.
Campbell, David (Thornden), Syracuse.
Campbell, Elias B., Poughkeepsie.
Campbell, John, New York.
Campbell, John S., New York Mills.
Candee, Daniel, Syracuse.
Canfield, Clarence W., Athens, Pa.
Cantwell, Thomas W., Albany.
Carl, Ira, Weedsport.
Carpenter, Franklin, Gansevoort.
Carpenter, Isaac, Shekomeko.
Carr, Samuel M., Elmira.
Carter, David K., Rochester.
Carter, George F., Syracuse.
Carter, John S., Chicago, Ill.
Cary, H. N., Whitesboro.
Case, Henry J., Auburn.
Case, Henry R., Cutting.
Catlin, George L., Apalachin.
Caywood, Chauncey C., Weedsport.
Chadderdon, Isaac, Weedsport.
Chaffee, Burritt, Syracuse.
Chaffee, James E., Heuvelton.
Chamberlain, Frank O., Canandaigua.
Chamberlain, Olcott A., Richfield.
Chandler, Harvey G., Ogdensburg.
Chandler, W. Y., Ogdensburg.
Chapin, Joseph Y., Ogdensburg.
Chapman, Crocker C., Hoosick Falls.
Chapman, C. E., Peruville.
Chapman, E. E., Syracuse.
Chapman, Frank B., Syracuse.
Chapman, Hiram, Baldwinsville.
Charles, Richard S., Angelica.
Chase, Col. A. C., Syracuse.
Chase, Carlton A., Syracuse.
Chase, Jonathan C., Syracuse.
Chase, John L., Johnson's Creek.
Chase, R. G., Geneva.
Chatfield, A. F., Albany.
Cheney, Walter W., Manlius.
Chester, E. S., Albion.
Chrystie, Albert N., Havre, France.
Church, Perry, Knowlesville.
Church, Richard, Belvidere.
Church, Seth R., Syracuse.
Claris, Dr. John T., Buffalo.
Clancy, J. R., 247 N. Salina street, Syracuse.
Clark, B. Wheaton, Lockport.
Clark, E. J., East Onondaga.
Clark, Franklin, Albion.
Clark, J. Henry, Elmira.
Clark, James H., Port Chester.
Clark, Judson H., Elmira.
Clark, Silas S., Potsdam.
Clark, C. P., Syracuse.
Clarrey, J. R., Syracuse.
Cleveland, Newcomb, Albany.
Clough, T. T., Syracuse.
Coakley, Daniel, Syracuse.
Coakley, Michael, Syracuse.
Coan, Ezra T., Albion.
Coates, George H., Elmira.
Coe, R. E., Kirkville.
Cobb, Emory, Kankakee, Illinois.
Cobb, A. H., Fairport.
Cocks, Isaac H., Old Westbury.
Cogswell, P. J., Rochester.
Cogswell, Ledyard, Albany.
Cogswell, William L., New York.
Coit, John M., New York.
Cole, Charles C., Jordan.
Cole, John A., Northville.
Cole, Noah H., Mendon.
Cole, Walter, Batavia.
Colebrook, William H., Syracuse.
Colegate, Robert, New York.
Coleman, Theodore H., Syracuse.
Collender, Hugh W., New York.
Collins, A., Rochester.
Collins, James E., Elmira.
Combs, J. S., Stafford.
Comerford, John J., Syracuse.
Comstock, S. L., 110 Wolf street, Syracuse.
Conkey, Charles N., Canton.
Converse, Frank A., Woodville.
Converse, George H., Woodville.
Converse, James F., Woodville.
Conygham, Thomas, Morley.
Cook, Elisha, Poplar Ridge.
Cook, H. E., Denmark.
Cook, Herbert J., Little Utica.
Cook, S. H., Jr., Camillus.
Cook, Frederick, Rochester.
Cooke, Roland C., Whitehall.
Cooley, A. H., Little Britain.
Coolidge, Charles, Phelps.
Coon, Morrell, Leonardsville.
Coon, S. Mortimer, Oswego.
Coonley, Irving, Cicero.

Cooper, H. A., North Wolcott.
Cooper, James F., Albany.
Cooper, Joseph M., New York.
Corbett, Lee C., Watkins.
Corbett, J. W., Watkins.
Corey, George W., West Genesee street, Syracuse.
Cornell, Alonzo B., Ithaca.
Cornell, Charles Ezra, Ithaca.
Cornell, Charles P., Baldwinsville.
Cornell, Joseph M., Albion.
Cornell, Franklin C., Ithaca.
Cossitt, Davis, Onondaga.
Costello, John H., Syracuse.
Cotton, George G., Fairmount.
Covert, E. B., Syracuse.
Cowan, John, Lakeland.
Cowie, William, Syracuse.
Cox, James W., Albany.
Cox, W. W., Syracuse.
Cox, William B., Baldwinsville.
Cramer, Olen, Baldwinsville.
Crandall, William DeLoss, West Edmeston.
Crandall, E. J., Clifton Springs.
Crapo, John M., Albany.
Crawford, A. H., Liverpool.
Creede, William F., New York.
Crofoot, James R., Constableville.
Cronin, J. W., Syracuse.
Crosman, C. W., Rochester.
Crossman, H. D., Sennett.
Crozier, William, Northport.
Crumb, E. W., Ouaquaga.
Crysler, Corydon, Syracuse.
Cullinan, P. W., Oswego.
Cunningham, Jas. B., White Plains.
Curtis, Charles E., Ithaca.
Curtis, Dewitt C., Horseheads.
Curtis, D. W., Syracuse.
Curtis, Edward F., Syracuse.
Curtis, Gates, Ogdensburg.
Curtis, George, Elmira.
Curtis, John P., Marcellus.
Curtis, N. Martin, Ogdensburg.
Cuthbert, William, Hammond.

D

Daboll, Charles E., Memphis.
Dagge, Edward, Brighton.
Dallas, Dr. A. J., Syracuse.
Danforth, Elliot, Bainbridge.
Daniels, William H., Ogdensburg.
Danziger, I. Henry, Syracuse.
Darrow, M. C., Solvay.
Davey, Edward H., Medina.
Davis, Nelson S., North Syracuse.
Davies, William H., Ogdensburg.
Davis, J. C. Bancroft, Washington, D. C.
Davison. G. Howard, Millbrook.
Dawley, F. E., Fayetteville.
Dean, Lorenzo D., Ogdensburg.
De Angelas, W. W., Holland Patent.
Decker, Peter L., Cherry Creek.
Dederick, Levi, Albany.
Dederick, Peter K., Albany.
DeForest, D. W. C., Defreestville.
DeForest, Jacob J., Duanesburg.
Degraff, Alfred, Fonda.
Degraff, James, Highland.
DeGrauw, Aaron A., Jamaica.
DeLong, M. B., Utica.
Dempsey, Samuel, Syracuse.
Denison, Frank P., Syracuse.
Denniston, Augustus, Washingtonville.
Dennistoun, William, New York.
Deuel, Stephen T., Little Rest.
Devereaux, Alvin, Deposit.
Dewey, C. D., Batavia.
DeWitt, Abram V., Albany.
DeWitt, Martin C., Skaneateles.
Dexter, H. W., Newport.
Dickinson, E. D., Syracuse.
Dickinson, Austin R., Syracuse.
Didama, John E., Medina.
Didama, Justus E., Medina.
Dike, James P., New York.
Dillon, John J., New York.
Dinsmore, William B., Staatsburg.
Doane, Rev. William C., Albany.
Docharty, James B., Albany.
Dodge, Henry, New Hartford.
Dodge, William E., New York.
Dolbear, F. H., Fulton.
Dolbear, Martin E., Fulton.
Dolson, C. A., 57 Ellicott square, Buffalo.
Doncaster, Daniel, Long Island City.
Donnelly, P. H., Cazenovia.
Doolittle, L. F., Ouaquaga.
Dorchester, Robert E., Marcellus.
Dounce, William J., Elmira.
Downer, Ezra, Jr., Syracuse.
Downer, William W., 333 Breckenridge street, Buffalo.
Downs, Arthur L., Mattituck.
Doyle, Dr. Gregory, Syracuse.
Doyle, William, Albany.
Duffy, Hugh, Cortland.
Dunfee, John, Syracuse.
Dunn, John, Jr., Syracuse.
Dunn, Thomas, Syracuse.
Dunning, W. D., Syracuse.
Denning, David M., Auburn.
Durkee, J. H., Sandy Hill.
Durant, Edward A., Jr., Albany.
Durston, J. F., Syracuse.
Dutcher, John B., Pawling.
Dutcher, J. Gerow, Pawling.
Dwight, Henry D., Syracuse.
Dyer. Marshall R., Pompey.

E

Earle, C. P., Gouverneur.
Earle, Orin R., Sandy Creek.
Earll, A. J., Skaneateles.
Earll, J. Horatio, Skaneateles.
Eastman, William L., Ovid.
Eastman, A. R., Waterville.
Easton, James H., Syracuse.
Ebeling, F. H., Syracuse.
Ebner, C. F., 117 Baker street, Syracuse.
Eckenberger, Haman, Elmira.
Ecker, George D., Solvay.
Ecker, I. J., Belle Isle.
Eddy, E. J., Syracuse.
Eddy, John W., Saratoga.
Edwards, Ira, Holly.
Eli, Francis, Deansville.
Ellis, Earl E., Camillus.
Ellis, Edwin, Albany.
Ellis, James, Syracuse.
Ellsworth, Charles E., Hammond.
Ellsworth, Richard B., Canton.
Ellsworth, S. H., Starkville.
Ellwanger, George, Rochester.
Ely, L. D., Rochester.
Emmons, F. L., Syracuse.
Erhard, Frederick, Syracuse.
Erwin, E. H., Painted Post.
Erwin, Samuel E., Morley.
Everingham, F. M., East Onondaga.
Everson, Charles B., Syracuse.
Everts, U., Jr., Meridian.

F

Faile, Charles V., New York.
Faile, Thomas H., Jr., New York.
Fairchild, George, Liverpool.
Fairchild, Herman, Liverpool.
Fairchild, Charles A., Syracuse.
Fairchild, M. B. (M. D.), Syracuse.
Fairchild, Ransom, Liverpool.
Farrington, Barney, Syracuse.
Farrington, Harvey, Croton-on-Hudson.
Faulkner, Lester B., Dansville.
Fage, William, Syracuse.
Fancher, Len., Syracuse.
Farrell, John H., Albany.
Fay, Ernest A., Potsdam.
Fell, John, Elmira.
Fellows, J. P., Syracuse.
Fellows, Benjamin, Chili.
Fellows, George B., Unadilla.
Felton, Benjamin F., Tonawanda.
Fenner, F. W., Baldwinsville.
Fenner, Seth, East Aurora.
Fenton, H. N., Morley.
Ferguson, Amos, Utica.
Fergusson, Mrs. Mary D., Syracuse.
Ferris, G. C., DeWitt.
Ferris, Charles C., DeWitt.
Fish, Liberal C., Laporte, Iowa.
Fisher, Conrad J., Manlius Station.
Fisher, John C., Chipman.
Fisk, Charles H., Syracuse.
Fisk, Sanford N., Pine Valley.
Fitzgerald, Lawrence J., Cortland.
Flagler, Benjamin, Suspension Bridge.
Fleming, Oliver, Oneonta.
Fleetham, Daniel W., Heuvelton.
Flood, Thomas S., Elmira.
Floto, Ernest, New York.
Flynn, G. D., Union Springs.
Fondey, William T., New York.
Ford, Henry A., Westerlo.
Ford, William, Big Flats.
Forey, John H., Syracuse.
Forrester, W. E., Hammond.
Forsyth, James, Owego.
Foster, D. Henry (M. D.), Clifton Springs.
Foster, Isaac H., Baldwinsville.
Foster, Nat. W., Riverhead.
Fowler, William C., Warsaw.
Fox, Eli (M. D.), Mohawk.
Fox, P. W., Morley.
Frame, William, Flushing.
Francis, Daniel J., Syracuse.
Francklyn, Reginald, 74 Beaver street, New York.
Frank, Samuel R., Syracuse.
Frank, Nathan, Ogdensburg.
Frazer, Fred., Syracuse.
Frazer, George K., Syracuse.
Fredericks, John S., Syracuse.
Freeman, Isaac, Bemis Heights.
Freeman, John G., Lockport.
Freeman, George, Syracuse.
French, G. G., Mexico.
French, Henry C., Wells, Penn.
French, J. D. W., North Andover, Mass.
French, Mansfield J., Syracuse.
Frey, William, East Syracuse.
Friedel, William, Syracuse.
Frothingham, James H., Brooklyn.
Frothingham, William M. (M. D.), Washington Heights.
Fugett, J. M., Baldwinsville.
Fuller, Harrison, Adams Centre.
Fulton, Rufus K., Morley.

G

Gage, A. S., Homer.
Gale, Lee, Syracuse.
Gallup, Wayne, Macedon.
Gandy, Shepard, New York.
Gardenier, A. B., Niverville.
Gardner, Arthur L., Springfield, Md.
Gardner, Emmet V. R., Westtown.
Garnett, W. B., Syracuse.
Gates, A. R., Memphis.
Gates, D. G., Chittenango.

Gates, F. H., Chittenango.
Gates, J. W., Chittenango.
Gaylord, Greenville M., Fairmount.
Geer, Robert, Albany.
Gere, George C., Syracuse.
Gere, Irving N., Syracuse.
Gere, William A., Belle Isle.
Gere, W. C., Syracuse.
Gibbale, Isadore H., Medina.
Gibbs, J. E., Watertown.
Gibbs, C. M., Syracuse.
Gibson, Richard, Delaware, Ontario.
Gibson, William L., Elmira.
Giddings, F. N., Baldwinsville.
Giffin, David S., Heuvelton.
Gifford, L. D., Shelby Centre.
Gilbert, B. D., Clayville.
Gilbert, J. M., Syracuse.
Gilbert, William H., Richland.
Gillett, Harris, Sidney.
Gillett, William J., Syracuse.
Gleason, Willis, Liverpool.
Gleason, W. A., Liverpool.
Glover, John H., New York.
Gordenier, John, Oswego.
Gordon, Robert, New York.
Gore, W. E., Richville.
Gorham, Emmett, Elbridge.
Gorham, William B., Camillus.
Gorman, Charles, Medina.
Gould, James F., Warners.
Grace, Thomas J., Syracuse.
Graham, George, Weedsport.
Grant, Israel P., Horseheads.
Grant, Alexander, Jr., Syracuse.
Grassman, Jacob, Syracuse.
Gray, William H., Utica.
Gray, David, Utica.
Gray, John D., Syracuse.
Green, Andrew H., Syracuse.
Green, Andrew H., New York.
Green, Charles A., Rochester.
Green, Ira W., East Avon.
Green, J. F., Baldwinsville.
Green, N. H., Batavia.
Green, Willis H., Belleville.
Greene, Everett, Brooklyn.
Greenleaf, Habert S., Rochester.
Greenway, John, Syracuse.
Greer, Thomas H., Albany.
Gregor, David, Hammond.
Gregory, George Frederick, "The Yates," Syracuse.
Gregory, H. C., Unadilla.
Groesbeck, E. A., Albany.
Gross, James H., Albany.

H

Haberle, William H., Syracuse.
Haberle, Charles, Syracuse.
Hadden, J. B., Pultney.
Hagan, William E., Troy.
Hale, E. R., Elbridge.
Hall, Charles C., Syracuse.
Hall, F. G., Elmira.
Hall, John B., Canandaigua.
Hall, Pelig, New York.
Hall, George, Ogdensburg.
Hall, W. W., Gouverneur.
Hallet, J. S., New York.
Hallock, J. H., Saranac Lake.
Hallock, Stephen, Albion.
Hallock, William, Albion.
Halloran, Patrick, Syracuse.
Hamburger, David J., Syracuse.
Hamilton, William, Westmoreland.
Hamilton, Levi T., Weedsport.
Hamilton, William, Caledonia.
Hamilton, William A., Albany.
Hamlin, C. J., Buffalo.
Hanchett, Charles G., Syracuse.
Hand, Thomas J., 7 Nassau street, New York City.
Harberle, Frank B., Syracuse.
Hard, Henry M., Lydonville.
Harder, Minard, Cobleskill.
Hardy, Don P., Auburn.
Hardy, Elias, Auburn.
Harmon, John S., Chatham.
Harmon, John, Ogdensburg.
Harmon, A. B., Weedsport.
Harison, Thomas L., Morley.
Harrison, George D. L., New York.
Harrison, Richard, Canton.
Harrison, William B., New York.
Hart, Charles H., Syracuse.
Hart, E. Kirk, Albion.
Hartman, L. B., North Sparta.
Hartshorne, George, Rahway, N. J.
Hasbrouck, Lewis, Ogdensburg.
Haskell, William H., Albany.
Haskins, Marshall B., Volney.
Hatch, Lewis M., Ashville, N. C.
Hathaway, J. R., Cortland.
Haupt, Henry H., Dryden.
Haven, John, Fort Washington.
Havens, Charles H., Benton Centre.
Haviland, Mrs. William G., West Hoosick.
Hawkins, E. T., Syracuse.
Hawks, E. B., Wells Bridge.
Hawley, Mrs. Estelle F., Pittsford.
Hawley, Frank W., Pittsford.
Hawley, George W., Warners.
Hawley, J. Dean, Syracuse.
Haxton, William H., Green Haven.
Hay, M. L., Belle Isle.
Hayden, L. C., 1002 West Genesee street, Syracuse.
Hayden, S. C., Syracuse.
Hayhoe, James H., Syracuse.
Haynes, E. L., Haynes.
Hayward, Edwin S., Rochester.
Hazleton, B. F., Jamestown.

Heath, Allen S., New York.
Heaton, Charles E., Washington Heights, Chicago, Ill.
Heffron, D. S., Washington Heights, Chicago, Ill.
Hegeman, Edgar, Middle Falls.
Herriman, Carlisle B., Ogdensburg.
Henderson, Alexander, Syracuse.
Henderson, J. M., Syracuse.
Hendricks, Francis, Syracuse.
Hendricks, Rev. Thomas A., Union Springs.
Henry, George S., New York.
Herman, John, Ogdensburg.
Hess, Elmon, West Somerset.
Hexamer, Frederick M., New York.
Hicks, Benjamin D., Old Westbury.
Hier, John P., Syracuse.
Higgins, Alfred, Syracuse.
Hill, Hon. David B., Albany.
Hill, D. Munro, Elbridge.
Hill, Albert J., Medina.
Hilton, Albert B., 7 W. Thirty-fourth street, New York.
Hilton, James, New Scotland.
Hilton, Joseph, New Scotland.
Hinkley, David J., Brookfield.
Hinsdale, Alfred L., Belle Isle.
Hiscock, Frank H., Syracuse.
Hiscock, Albert K., Syracuse.
Hitchcock, C. B., Cortland.
Hitchcock, F. B., Cortland.
Hitchcock, James B., Syracuse.
Hoag, Claudius L., Lockport.
Hoag, Harvey, Medina.
Hoag, Ira W., Pawling.
Hoag, Jonathan, Tomhannock.
Hodges, F. B., Syracuse.
Hoe, Peter S., 504 Grand street, Tarrytown.
Hoffman, George W., Elmira.
Hoffman, L. M., New York.
Hoffman, Charles L., Syracuse.
Hoffman, W. H., Stiles.
Holbert, George W., Elmira.
Holbert, Joseph E., Chemung.
Holbert, Joshua S., Chemung.
Holcomb, George O., Troy, Pa.
Holden, Edward C., McGrawville.
Holden, H. S., Syracuse.
Holdridge, Daniel D., Medina.
Holihan, T. E., 1101 Milton avenue, Syracuse.
Holley, C. M., Glens Falls.
Holmes, A. B., New York.
Holt, Leander A., Potsdam.
Hood, Silas M., Knowlesville.
Hooker, Horace M., Cooperstown.
Hooker, H. C., Syracuse.
Hope, J. L., Madison, N. J.
Hopkins, Hiram P., Buffalo.
Hopkins, William R., Utica.
Hopkins, William E., Syracuse.
Horton, Alson W., Honeoye Falls.
Hotaling, Albert T., Baldwinsville.
Hotaling, D. B., Jamesville.
Hotaling, G. H., Baldwinsville.
Hotchkin, Alfred J., Syracuse.
Houghton, J. Chandler, Ogdensburg.
Howard, S. E., Fancher.
Howe, Edgar D., Weedsport.
Howe, Lewis B., Jordan.
Howe, Squire, Geneva.
Howe, Walter, New York.
Howell, F. Bowen, Medina.
Howell, H. B., Medina.
Howland, Obadiah, Auburn.
Howlett, F. C., Syracuse.
Howlett, Alfred A., Syracuse.
Howlett, A. Amos, Syracuse.
Hoxie, Samuel L., Leonardsville.
Hoxie, Solomon, Whitesboro.
Hoyt, Alfred M., New York.
Hoyt, Lucius B., Albany.
Hoyt, Frank D., Mottville.
Hubbard, Charles, Syracuse.
Hubbard, George C., Cortland.
Hubbell, Charles E., Syracuse.
Hubbell, Eli S,. Elmira.
Hughson, Kincaid A., Syracuse.
Hulbert, Ernest M., Cortland.
Hull, Benjamin L., Syracuse.
Humbert, Charles E., Syracuse.
Humphry, James R., Heuvelton.
Hun, Marcus T., Albany.
Hunt, Charles, Delphi.
Hunt, James, Syracuse.
Hunter, J. C., Sterling Valley.
Hunter, John, Sterling.
Hunter, Thomas, Sterling.
Hurd, Luther D., Holley.
Hurlbut, Wm. H., New York.
Hutchins, Lewis W., Bowen's Corners.
Hutchinson, Charles W., Utica.
Hutchinson, Almanzor, Gaines.
Hyde, Salem, Syracuse.

I

Ingalsbe, Greenville M., Sandy Hill.
Ingalsbe, James L., Glens Falls.
Ingalsbe, Royal, South Hartford.
Ingersoll, George, Fonda.
Irvin, Richard L., New York.
Irving, Lewis M., New York.
Isham, William B., New York.
Ives, Martin V. B., Potsdam.
Ives, F. O., South Easton.

J

Jackson, J. Carl, Lockport.
Jacobs, H. A., Syracuse.
Jacobson, Nathan R., Syracuse.
James, Edward C., New York.
James, Roscoe C., Hoosick.

James, Sylvester B., Hoosick.
Jaques, Hiram M., Wright's Corners.
Jaques, O. S., Wright's Corners.
Jarvis, Ira S., Hartwick Seminary.
Jenkins, Jonathan H., Elmira.
Jennings, Dwight P., Syracuse.
Jerome, C. W., Fabius.
Jerome, Henry, Fairmount.
Jerome, J. S., Fairmount.
Jewett, Henry C., Buffalo.
Johnson, Benjamin W., Albany.
Johnson, Chapman L., Albany.
Johnson, Edward O., 607 Bear street, Syracuse.
Johnson, George W., Geneva.
Johnson, Henry, Belle Isle.
Johnson, Hugh, DePeyster.
Johnson, H. H., Rural Hill.
Johnson, Jas. Boorman, New York.
Johnson, William H., Albany.
Johnson, Charles J., Syracuse.
Johnson, W. J., Little Utica.
Jones, Allen M., Fairmount.
Jones, Charles, Geneseo.
Jones, Harvey L., Ogdensburg.
Jones, Ira A., Breesport.
Jones, John W., Elmira.
Jones, Richmond, Elmira.
Jones, R. W., Syracuse.
Jones, William B., Albany.
Jones, W. Martin, Rochester.
Jones, Edward F., Binghamton.
Jones, L. T., Syracuse.
Joy, Edward, Syracuse.
Judd, H. H., Syracuse.
Judson, Cyrus Field, Dobbs Ferry.
Judson, E. B., Syracuse.
Juliand, Joseph, Bainbridge.

K

Kanaley, J. D., Weedsport.
Kane, W. H., New York.
Kau, Michael, Boonville.
Kaufman, John S., Syracuse.
Keays, Edward, Albany.
Keck, Philip, Johnstown.
Keeler, Edward Elmer, Syracuse.
Keeler, William H., Albany.
Keese, Samuel T., New York.
Kellogg, John M., Ogdensburg.
Kellogg, O. J., Camillus.
Kellogg, O. U., Cortland.
Kelly, James M., Baldwinsville.
Kelly, Patrick, West Troy.
Kelly, William, Jr., New York.
Kemble, Peter, New York.
Kemble, Richard L., New York.
Kemble, Gouverneur, New York.
Kemble, Gouverneur, Jr., New York.
Kennedy, R. Lenox, New York.
Kennedy, Bradford, Syracuse.
Kennett, J. R., Syracuse.
Kent, George B., Syracuse.
Kent, H. J., Palmyra.
Kent, James, Fishkill.
Kent, Edwin C., New York.
Kent, William, New York.
Kenyon, G. M., Syracuse.
Kenyon, George G., Syracuse.
Kenyon, Jacob C., Baldwinsville.
Kenyon, John S., Syracuse.
Kerr, John L., Syracuse.
Ketchum, Morris, New York.
Kevand, David, Weedsport.
Kieffer, Charles, Syracuse.
Kieffer, Joseph D., Syracuse.
Kimball, William E., New York.
Kimball, W. H., Canton.
Kimberly, Albert, Baldwinsville.
Kincaid, James C. P., Utica.
Kincaid, J. F., Syracuse.
King, Asahel A., Lafayette.
King, John A., Jr., Great Neck.
King, Rufus H., Albany.
King, Russell G., Lafayette.
King, William F., New York.
Kingsford, John P., New York.
Kinney, C. L., Cortland.
Kirby, William A., Auburn.
Kirk, George Wistar, New York.
Kirk, William B., Syracuse.
Kirkpatrick, William, Syracuse.
Klock, E. M., Syracuse.
Knapp, A. A., Preble.
Knapp, C. W., Syracuse.
Knapp, E. H., Fabius.
Knapp, Edward J., Jr., New York.
Knapp, Ezra R., Skaneateles.
Knapp, P. S., Syracuse.
Kneeland, John H., New York.
Knickerbocker, Geo. H., Shekomeko.
Knowles, Charles R., Albany.
Kohles, Michael, Syracuse.
Kosters, C. B., Auburn.
Kracke, F. J. H., 317 Washington Market, New York.
Krause, John, Clarence Hollow.

L

Labishiner, Emanuel, New York.
Lacy, Henry, Syracuse.
Ladd, J. M., Victor.
La Homadieu, W. H., Medina.
Lake, John W., Medina.
Lamb, Anthony, Syracuse.
Lamont, Edward W., Cobleskill.
Lamphere, J. H., Weedsport.
Lanehart, George D., Auburn.
Lang, Frank, Syracuse.
Langdon, Charles J., Elmira.
Langworthy, Hollum, West Edmeston.
Langworthy, Irwin, South Brookfield.
Lanigan, Daniel M., Syracuse.

Lansing, Charles, Lansingburg.
Lansing, J. E., Albany.
Lansing, J. Townsend, Albany.
Larned, George C., Syracuse.
Larwood, Thomas W., Albany.
Lathrop, Ariel, Albany.
Lattener, Nicholas, 313 Butternut street, Syracuse.
Lattin, Frank H., Albion.
Lawrence, A. B., Warsaw.
Lawrence, F. N., Flushing.
Lawrence, Lewis H., Utica.
Lawler, John, Auburn.
Lawyer, Luther, Watertown.
Lay, Frederick W., Greece.
Leach, Almon, Utica.
Leavitt, Henry S., New York.
Ledyard, R. F. H., Cazenovia.
Lee, William H., New York.
Lee, William H. L., New York.
Leech, Thomas J., Syracuse.
Lent, L., Lent.
Leonard, George B., Syracuse.
Leonard, Daniel, Albany.
Leonard, George S., Syracuse.
Levey, John P., Lyndonville.
Lewis, A. F., Syracuse.
Lewis, C. Whitney, Hopewell.
Lewis, David B., New York.
Lewis, John G., Frankfort.
Lewis, Oscar J., Schodack Centre.
Lewis, O. S., 1713 West Genesee street, Syracuse.
Lexow, Rudolph, Nanuet.
Leyden, Hart C., Syracuse.
Liautard, A. F. (M. D.), New York.
Lincoln, O. M., Newark.
Lindley, John, New York.
Listman, Charles, Syracuse.
Litchard, A. W., Rushford.
Littel, H. M., Macedon.
Little, Charles W., Albany.
Littlefield, R. M., Afton.
Livingston, John Henry, Clermont.
Livingston, Robert, Jr., New York.
Lock, F. D., Buffalo.
Locke, James S., Millport.
Loftie, Henry, Syracuse.
Long, E. B., White Plains.
Look, S. J., Louisville, Ky.
Loomis, A. J., Cicero.
Loomis, H. B., New York.
Loos, Conrad, Syracuse.
Lormore, William J., Elmira.
Lough, George, Hartwick.
Lounsbury, John W., Port Chester.
Lowe, Joseph R., Big Flats.
Lowman, F. C., Nichols.
Ludwig, Charles, 1123 Belevue avenue, Syracuse.
Lumbard, O. G., 312 Almond street, Syracuse.
Lummins, J. Maxwell, New York.
Lusk, Stafford S., Victor.
Luther, Alfred C., Syracuse.
Lyboult, J. H., Camillus.
Lyman, John, Syracuse.
Lynd, George P., Albany.
Lynde, Dolphus S., Canton.
Lyon, Henry, Syracuse.

M

Macomb, John N., Lawrence, Kans.
McCann, George S., Elmira.
McCann, James, Elmira.
McCann, James, Jr., Elmira.
McCann, John, Elmira.
McCarthy, Charles C., Syracuse.
McCarthy, Dennis, Syracuse.
McCarthy, John, Syracuse.
McCarthy, M. J., Syracuse.
McCarthy, Robert, Syracuse.
McChesny, Albert E., Syracuse.
McClure, William H., Albany.
McComb, George T., Lockport.
McCormick, A. J., Medina.
McCracken, H. J., Belle Isle.
McDougal, C. D., Auburn.
McDowell, Willis G., Syracuse.
McDowell, John H., Syracuse.
McElroy, John E., Albany.
McFarrand, J. A., Cherry Valley.
McGowan, Charles G., Elbridge.
McGraw, Joseph, Dryden.
McHarg, Henry K., New York.
McHarg, John W., Albany.
McKenzie, Daniel, Morley.
McKinney, James, Albany.
McLaury, Charles D., Portlandville.
McLennan, P. B., Syracuse.
McMillan, James, Fairport.
McMullen, Walter, Baldwinsville.
McNab, Rev. William J., Medina.
McNamara, John, Skaneateles.
McNeill, R. C., Campville.
McNish, Charles W., Ovid.
McVickar, Edward, Collinsville.
Madden, A. C., Brockport.
Mager, George J., Cortland.
Magone, Daniel, Ogdensburg.
Main, C., Camillus.
Makyes, Albert C., Onondaga.
Makyes, E. L., Onondaga Hill.
Malby, George R., Ogdensburg.
Mallock, P. J., Caledonia.
Mallory, Jared, Mallory.
Mann, J. F., Utica.
Manning, James H., Albany.
Mantel, Florian, Syracuse.
Manzer, De Los, Solvay.
Markham, William G., Avon.
Marks, Frank, Chapinville.
Martin, Frank L., New York.
Martin, Dr. L., Baldwinsville.
Martin, L. King, Ogdensburg.

Martin, William R., New York.
Martyn, Albert T., Canton.
Marvin, Eugene, Warners.
Marvin, Fred. A., Baldwinsville.
Marvin, George W., Warners.
Marvin, James M., Saratoga Springs.
Mason, John W., Brooklyn.
Mason, L. C., Syracuse.
Masters, Joseph E., Syracuse.
Mather, Andrew E., Albany.
Mather, F. E., New York.
Mather, Joshua, Utica.
Mathewson, James W., Onondaga Hill.
Mathewson, Park, Detroit, Mich.
Mattison, C. E., Jacksonville.
Matthews, Charles, West Troy.
Maxwell, Henry E., Geneva.
Maxwell, Joshua I., Geneva.
Maxwell, Thompson C., Geneva.
Maxwell, W. T., Collamer.
Mead, F. S., Shelby Basin.
Mekell, Abram V., North Hector.
Melick, William B., Albany.
Merchant, Abel, Nassau.
Merrell, G. L., Syracuse.
Merriam, Charles M., Constableville
Merriam, Clinton L., Leyden.
Merrick, Asa L., Syracuse.
Merrill, F. J. H., Albany.
Merriman, Charles A., Ogdensburg.
Merriman, Fred. J., Madrid.
Merritt, Edwin A., Potsdam.
Merritt, Edwin A., Jr., Potsdam.
Mertens, J. W., Syracuse.
Messiter, George N., Brooklyn.
Meyer Theo. F. M., New York.
Middleton, Robert, Utica.
Miles, Ira C., Edwards.
Miller, Brayton B., Lowville.
Miller, Gerritt S., Peterboro.
Miller, Peter, Fredonia.
Miller, James, 311 Slocumb avenue, Syracuse.
Miller, Riley V., Syracuse.
Miller, Warner, Herkimer.
Mills, C., Baldwinsville.
Mills, H. M., Rochester.
Mills, J. Newton, Cato.
Mitchell, E. D., Weedsport.
Mitchell, Truman A., Weedsport.
Mixter, David E., Jordanville.
Moak, Philander, Cooperstown.
Moller, William F., Irvington.
Montgomery, R., Ogdensburg.
Moody, Robert, Stanley.
Moon, C. B., Saratoga Springs.
Moore, Asa J., DeKalb.
Moore, Dr. Edward, Albany.
Moore, Frank M., Syracuse.
Moore, Henry C., Albany.
Moore, John, Syracuse.
Moore, John S., Medina.
Moore, W. S., Mount Upton.
Mordoff, M. C., Rochester.
More, William, Hammond.
Morgan, B. F., Albion.
Morgan, Henry A., Aurora.
Morgan, J. Pierrepont, New York.
Morgan, M. T., North Winfield.
Morris, A. Newbold, Barton.
Morris, Eddie B., Ogdensburg.
Morris, Fordham, 16 Exchange Place, New York.
Morris, James R., Ogdensburg.
Morris, Lewis G., Fordham.
Morris, Gabriel A., Syracuse.
Morris, William F., Baldwinsville.
Morrison, D. A., Montgomery.
Morton, Hon. Levi P., New York.
Morss, B. G., Red Falls.
Mortz, M. C., Mohawk.
Moser, C. P., Syracuse.
Moses, Frank H., Skaneateles.
Mosher, E. D., Mapleton.
Mosher, Joseph F., New York.
Mount, Andrew, New York.
Mowry, J. S., Rome.
Moyer, B. W., Syracuse.
Moyer, H. A., Syracuse.
Munro, Isaac H., Camillus.
Munro, John, Camillus.
Munroe, Henry S., Belle Isle.
Munroe, John C., Belle Isle.
Munroe, David H., Belle Isle.
Munson, E. S., Franklin.
Myers, Charles, New York.
Myers, Gerritt S., Conewango.
Myers, Michael J., 1814 W. Fayette street, Syracuse.
Myers, Marvin E., Charlton.

N

Nash, John M. L., New York.
Neal, W. H. H., Syracuse.
Nearing, G. W., Syracuse.
Neish, William, Hamden.
Nellis, F. D., Syracuse.
Nevin, John H., Ogdensburg.
Newcomb, Thomas, Albany.
Newcomb, W. W., North Syracuse.
Newell, Edgar A., Ogdensburg.
Newell, George A., Medina.
Newland, Henry, Stillwater.
Newman, W. W., South Onondaga.
Newton, W. H., Cortland.
Newton, William, Henrietta.
Nice, John L., Tonawanda.
Nichols, C. B., Auburn.
Nichols, E. E., South Onondaga.
Nichols, Oliver, South Onondaga.
Niver, W. K., Syracuse.
Nixon, S. Fred, Westfield.
Northrup, Hiram D., Ogdensburg.
Norton, John T., Albany.

Nott, Copely A., Utica.
Nottingham, Harvey B., Syracuse.
Nottingham, J. A., Syracuse.
Noyes, William L., Owasco.
Nusbaum, Israel, Albany.
Nutting, B. F., Woodville.
Nutting, Lewis A., 616 N. 2d North street, Syracuse.

O

O'Driscoll, Rev. James, Canton.
Ogden, George B., New York.
Ogden, Walter, New York.
Ogden, David B., New York.
Ogden, Ludlow, New York.
O'Hara, M. J., Camillus.
Olney, Peter B., New York.
Oliver, Robert S., Albany.
Olmstead, Henry M., Morristown, N. J.
Olmstead, Will H., Syracuse.
O'Neil, Thomas R., Syracuse.
O'Neile, Henry, Syracuse.
Ormiston, James, Cuba.
Ormsby, Oliver, Syracuse.
Orr, Robert, DePeyster.
Orr, James, DePeyster.
Osborn, Amos O., Waterville.
Osborne, John H., Auburn.
Osborne, Thomas M., Auburn.
Osborne, W. B., Victor.
Ostrander, Henry S., Knowlesville.
Ostrander, Homer A., Syracuse.
Ostrander, W. P., Schuylerville.
Otis, Isaac C., Jordan.
Otis, James, New York.
Owen, Jesse, Chemung.

P

Paddleford, Harvey, Paddleford.
Padgham, Amos, 120 Shonnard street, Syracuse.
Page, John R., Sennett.
Page, Joseph N., Syracuse.
Page, J. Will, Syracuse.
Page, Levi A., Seneca Castle.
Paine, Fred. B., South Granby.
Palmer, A. W., Syracuse.
Palmer, George C., Syracuse.
Palmer, James R., Weedsport.
Palmer, Samuel H., Ogdensburg.
Pangborn, William, Clyde.
Park, Curtis, Baldwinsville.
Park, Joseph, New York.
Parks, E. A., 105 West Brighton avenue, Syracuse.
Parke, H. S., New York.
Parker Abram X., Potsdam.
Parker, Amasa J., Albany.
Parker, C. L., Onondaga.
Parker, M. L., Lyndonville.
Parkinson, W. J., Flora, Miss.
Parks, Jonas, Horseheads.
Parsons, C. H., Fairmount.
Parsons, Frank M., Weedsport.
Parsons, John D., Albany.
Parsons, John D., Jr., Albany.
Parsons, J. Russell, Hoosick Falls.
Parsons, P. B., Camillus.
Parsons, R. D., Fulton.
Parsons, R. H., Lockport.
Parsons, W. A., Fairmount.
Paton, William, New York.
Patrick, W. C., Cobleskill.
Patterson, Calvin, Fairmount.
Patterson, L. L., Camillus.
Patton, David H., Albany.
Peabody, Charles A., Jr., New York.
Pearsall, N. B., Morris.
Pearson, Robert H., Lockport.
Pease, James D., Corning.
Pease, John F., Syracuse.
Peck, Benjamin F., East Bethany.
Peck, W. S., Syracuse.
Peebles, W. A., Martinsburg.
Peer, Frank S., Mount Morris.
Peet, Isaac Lewis, New York.
Pell, Robert L., Pelham Farm.,
Pellew, Henry E., Katonah.
Pendergast, P., Phoenix.
Pendry, William H., Albion.
Penfold, E., Jr., New York.
Penfold, William Hall, New York.
Perkins, F. E., Providence, R. I.
Perkins, J. V., 104 Seymour street, Syracuse.
Perry, A. D., Syracuse.
Perry, Marcus A., Buffalo.
Peters, William, Ogdensburg.
Peugnet, Charles, Cape Vincent.
Pfohl, Peter, Syracuse.
Phares, Henry, Syracuse.
Pharis, Charles S., Syracuse.
Pharis, M. P., Syracuse.
Phelps, Charles S., Homer.
Phelps, Thomas W., New York.
Philip, H. Van Ness, New York.
Philip, M. Hoffman, New York.
Phillips, Marcus H., Hulberton.
Phillips, John M., Hulburton.
Pierce, Marsh C., Syracuse.
Pierson, Henry L., New York.
Pierson, M. F., Seneca Castle.
Pillow, W. H., Reed's Corners.
Pinckney, Stephen R., New York.
Pine, A. I., Pittstown.
Pine, George W., Herkimer.
Plane, Thomas, Newfane.
Platt, James N., New York.
Platt, Thomas C., New York.
Plumb, O. F., Fairmount.
Plummer, Reuben S., Carylon.
Pollok, W. J., Hopewell.
Pomroy, William H., New York.
Pool, Nelson, Belle Isle.

Poole, Theodore L., Syracuse.
Poole, Theodore L., Jr., Syracuse.
Pooler Hiram A., 34 Gramercy Park, New York.
Porter, Ira, Jr., Albany.
Porter, James A., Lacona.
Porter, Peter A., Niagara Falls.
Porter, W. H., Auburn.
Porter, W. W., Syracuse.
Potter, A. B., Fairport.
Potter, Cranston, Elmira.
Potter, Howard, New York.
Potter, Lewis, Easton.
Powell, Edward A., Syracuse.
Powell, George T., Ghent.
Prentice, William P., New York.
Prentiss, J. H., Chicago, Ill.
Preston, George R., Cazenovia.
Price, George H., Albany.
Proctor, Thomas R., Utica.
Proctor, William L., Ogdensburg.
Pruyn, Charles L., Albany.
Pruyn, John V. L., Albany.
Pruyn, Robert C., Albany.
Putzinger, Isidore, Solvay.
Pyle, James, New York.

Q

Quackenbush, Cebra, Hoosick.
Quinlan, P. R., Syracuse.

R

Raines, John, Canandaigua.
Ramsdel, H. Stockbridge, Newburgh.
Randall, Benjamin, Chicago, Ill.
Randall, George H., Brooklyn.
Randall, Nathan, Syracuse.
Ranger, W. V., Syracuse.
Ransom, George F., Syracuse.
Rathbone, George, New London.
Rathbone, John F., Albany.
Rathbun, Acors, Albany.
Rathbun, Charles, Verona.
Rathbun, L. W., East Springfield.
Ratchford, James, Syracuse.
Ray, John P., Hemlock.
Read, James H., Utica.
Read, William G., New York.
Reade, Robert, New York.
Redfield, Frank B., Batavia.
Reed, Almet, New York.
Reed, I. C., Syracuse.
Reid, James R., Elmira.
Remington, Clarence D., Auburn.
Remington, Irwin D., Auburn.
Remington, William R., Canton.
Reynolds, John H., Albany.
Reynolds, Milton F., Auburn.
Reynolds, Samuel T., Elmira.
Rhodes, Almond H., Fairmount.
Rhodes, J. Irving, Camillus.
Rice, Albert J., Sodus.
Rice, James E., Yorktown.
Rich, A. P., Auburn.
Richards, C. O., Solvay.
Richards, William G., Syracuse.
Richardson, H. W., East Aurora.
Richardson, R. M., Syracuse.
Richardson, S. Brown, Lowville.
Rickett, Morris, DePeyster.
Riggs, C. G., Turin.
Ripley, Joseph, New York.
Ritter, M. B., Waterloo.
Roach, Paul, Quaker Street.
Robacher, Mrs. Cassie W., Marathon.
Robbins, George A., New York.
Roberts, Charles H., Pawling.
Roberts, Prof. I. P., Ithaca.
Roberts, Mrs. J. A., Pine Valley.
Roberts, John T., Syracuse.
Robertson, Dr. A. K., 63 Central place, Brooklyn.
Robie, Charles H., Savona.
Robinson, A. S., Morley.
Robinson, Chauncey N., Elmira.
Robinson, Charles, Fishkill Plains.
Robinson, Charles W., Hornellsville.
Robinson, George, Canton.
Robinson, Henry J., 54 East 66th street, New York.
Robinson, John A., Elmira.
Robinson, J. D., Sennett.
Robinson, Lewis T., Syracuse.
Robinson, W. D., Kanona.
Rockwell, H., Horseheads.
Rockwell, John B., Elmira.
Rockwell, S. D., New York.
Rodgers, L. M., Newtonville.
Roessle, E. O., Albany.
Roff, Alanson, Syracuse.
Rogers, Daniel E., Wheatland.
Rogers, Irwing B., Chittenango.
Rogers, Jeremiah B., Weedsport.
Rogers, Julius E., Binghamton.
Rogers, U. C., Albion.
Rogers, William H., Barre Centre.
Roosevelt, Col. Theodore, New York.
Root, Curtis, Reynold's Basin.
Root, C. P., Gilbertsville.
Root, F. P., Brockport.
Root, James, Skaneateles.
Rosenbloom, Daniel, Syracuse.
Ross, Warner L., Syracuse.
Ross, William F., 614 West One Hundred and Fourteenth street, New York City.
Royce, Charles H., Rhinecliff.
Rude, J. E., Weedsport.
Runyan, Vincent L., Seneca Castle.
Rupert, P. G., Seneca.
Rupert, W. P., Seneca.
Rupert, W. T., Seneca.

Russell, A. B., Syracuse.
Russell, C. H., East Onondaga.
Russell, Henry, Albany.
Rutherford, W. L., Waddington.
Rysdorph, Lawrence, Greenbush.

S

Sackett, C. C., Canandaigua.
Sackrider, Horace D., Canton.
Sadler, Russell Z., Syracuse.
Sager, A., Cortland.
Sampson, George G., Brooklyn.
Samson, William H., Spokane, Wash.
Sanders, J. H., St. Johnsville.
Sanders, Walter T. L., Schenectady.
Sanger, William Cary, Sangerfield.
Sard, Grange, Albany.
Satterlee, George, Fort Edward.
Saul, Charles F., Syracuse.
Saunders, Thomas P., Adams.
Savage, Charles, Elmira.
Savage, Thomas, New Hartford.
Sawyer, Judge John G., Albion.
Sawyer, John P., Gasport.
Sax, Jacob, Syracuse.
Sayre, Willis B., Horseheads.
Scharck, Anthony, Defreestville.
Scatcherd, John N., Buffalo.
Schenck, Adrian A., Syracuse.
Schofield, I. L., Chenango Bridge.
Schoonmaker, Henry, Becker's Corners.
Schraub, Fred C., Lowville.
Schreiner, O. H., New York.
Schultz, Jackson S., New York.
Schuyler, Gerritt L., Watervliet.
Schuyler, Isaac L., Manchester, Vt.
Schuyler, Peter C., New York.
Schuyler, Philip D., Fairmount.
Schuyler, P. J., Fairmount.
Schuyler, Philip S., Watervliet.
Schuyler, Richard P., West Troy.
Schwarz, A. H., Syracuse.
Scott, Dennis W., Medina.
Scott, Harry M., Medina.
Scott, John H., New York.
Scoville, J. V. H., New Hartford.
Seaman, P., Newburgh.
Searle, E. P., Albion.
Sears, W. J., Liverpool.
Seeber, Eli J., Depauville.
Seegur, Hiram, Adams.
Seeley, D. W., Albany.
Seeley, James, Geneva.
Seeley, R. F., Waterloo.
Seeley, W. W. (M. D.), Poughkeepsie.
Selkreg, John H., Ithaca.
Seney, George I., New York.
Seton, Alfred, New York.
Settle, DeForest, Syracuse.
Seward, Gen. William H., Auburn.
Seymour, Jay M., Clark's Mills.
Shafer, W. A., Milford.
Shangraw, John, De Witt Centre.
Shara, R. M., Oswego.
Shattuck, Jerome B., Cherry Creek.
Shattuck, J. S., Norwich.
Shaw, Frank E., Moons.
Shaw, George, Deerfield.
Shea, D. E., Syracuse.
Shea, J. R., Baldwinsville.
Sheldon, Clarence, Brooklyn.
Sheldon, D. S., Weedsport.
Sheldon, Henry K., New York.
Sheldon, James, New York.
Sheldon, James O., New York.
Sheldon, J. S., Weedsport.
Sheldon, Lucius M., Brooklyn.
Sheldon, W. C., Sennett.
Shephard, Edward M., Brooklyn.
Sherill, E., New Hartford.
Sherman, Benjamin L., New York.
Sherman, C. A., New York.
Sherman, Samuel, Lundy's Lane, Pa.
Sherwood, Charles E., Camillus.
Sherwood, E. D., Camillus.
Sherwood, Joseph M., Fairmount.
Sholes, N. T., Syracuse.
Shook, Sheridan, Barrytown.
Short, T. F., Syracuse.
Short, James, Ogdensburg.
Shuler, Duane V., Lockport.
Signor, Isaac S., Albion.
Simonds, Alexander B., New York.
Simonds, William B., New York.
Simpson, George G., Brooklyn.
Simpson, J. B., Jr., New York.
Simpson, John V., West Farms.
Simpson, William, West Farms.
Simpson, William, Jr., New Hudson.
Sisson, George M., Genoa.
Sisson, George W., Jr., Potsdam.
Skinner, Dr. E. C., East Syracuse.
Slack, Michael, Medina.
Slattery, Patrick, Syracuse.
Slee, John D. F., Elmira.
Slingerland, Wm. H., Slingerlands.
Sloan, Samuel, New York.
Slossen, H. L., Geneva.
Slossei, H. L., Geneva.
Smead, Dr. C. D., Logan.
Smedberg, Hugh A., New York.
Smith, Arnold E., Ogdensburg.
Smith, A. E., Jr., Camillus.
Smith, B. Lyman, 804 James st., Syracuse.
Smith, Charles A., Auburn.
Smith, Charles, Baldwinsville.
Smith, E. E., Syracuse.
Smith, Enos, Plainville.
Smith, F. Wayland, 26 Cortlandt street, New York City.
Smith, Dr. F. W., Syracuse.

Smith, Gabriel L., Elmira.
Smith, Grove B., Plainville.
Smith, Goldsborough C., Auburn.
Smith, George A., Frankfort.
Smith, H. Cordenio, Marcellus.
Smith, Henry L., Albany.
Smith, H. S., North Syracuse.
Smith, J. William, 1615 West Genesee street, Syracuse.
Smith, Lewis M., Elmira.
Smith, Lyman C., Syracuse.
Smith, M. C., Syracuse.
Smith, M. Homer, Baldwinsville.
Smith, Miles, Baldwinsville.
Smith, M. H., Geneva.
Smith, Silas G., Mechanicville.
Smith, Solomon P., Waterford.
Smith, Stephen, Mountainville.
Smith, S. W., Albion.
Smith, W. Harrison, Geneva.
Smith, W. A., Owego.
Smith, W. Judson, Syracuse.
Smith, Wing R., Syracuse.
Smith, William, Geneva.
Smith, W. C., 212 Putnam street, Syracuse.
Smith, W. L., Syracuse.
Smithers, Norman E. A., Ogdensburg.
Smylie, Frank W., Denver, Colo.
Snow, Charles W., Syracuse.
Snow, Orrin J., Syracuse.
Snyder, Charles, Edenton.
Snyder, Peter, Minoa.
Souci, George O., Weedsport.
Soule, Alexander C., Syracuse.
Soule, F. C., Syracuse.
Soule, O. F., Syracuse.
Spaulding, Henry F., New York.
Spaulding, N. G., Schodack Landing.
Spencer, J. E., Wampsville.
Spencer, H. J., Kiantone.
Spencer, Nelson S., New York.
Spoffard, Joseph L., New York.
Sprague, J. C., Ogdensburg.
Spratt, Thomas, Ogdensburg.
Spring, Frank D., Victor.
Squires, G. P., Marathon.
Squires, H. P., Marathon.
Stacy, Erastus W., De Kalb.
Stapleton, Charles W., Morrisville.
Starin, John H., Fultonville.
Stearns, George T., Marion.
Steele, Fred., 319 Willow street, Lockport.
Steele, Walter E., 319 Willow street, Lockport.
Stephens, Henry F., Syracuse.
Sterling, Lewis T., Gouverneur.
Stevens, F. C., Attica.
Stevens, H. J., Syracuse.
Stevens, LeRoy W., Auburn.
Stevens, Ward W., Lacona.
Stevenson, L. A., Syracuse.
Stevenson, L. E., Syracuse.
Stevenson, Theodore, Cortland.
Stewart, E. Leroy, Fishkill Landing.
Stickney, Albert, New York.
Stinard, Alfred F., Syracuse.
Stockwell, S. S., New York.
Stoddard, Increase B., Horseheads.
Stone, Charles L., Syracuse.
Stone, Horace G., Syracuse.
Stone, N. L., Potsdam.
Stork, Joseph, Medina.
Storm, Joseph H., Green Haven.
Story, Richard J., Greenbush.
Story, Richard R., Albany.
Stratt, F. C., Cortland.
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Stucky, George S., Marcellus.
Sturge, Willard, Weedsport.
Sturtevant, E. Lewis (M. D.), South Framingham, Mass.
Stuyvesant, John R., Poughkeepsie.
Sutherland, J. H., Pittsford.
Swain, Thomas M., Bronxville.
Swan, Benjamin L., Jr., Oyster Bay.
Swan, Robert J., Geneva.
Swartwout, Daniel, Owasco.
Sweeney, A. H., Albany.
Sweet, Albert L., Medina.
Sweet, J. E., Syracuse.
Sweet, W. A., Syracuse.
Sweezey, Richard L., New York.
Sweezy, George W., New York.

T

Taber, George, East Aurora.
Tabor, Ernest G., Meridian.
Talbert, J. H., Syracuse.
Talbott, Thomas, Jr., Syracuse.
Talheimer, Gates, Syracuse.
Tallcott, George M., Skaneateles.
Tallmadge, Samuel, Valatie.
Tanner, W. E., Syracuse.
Tappan, Wallace, Baldwinsville.
Taylor, Abram, Johnson's Creek.
Taylor, Eli. East Elba.
Taylor, E. W., Elmira.
Taylor, John W., Grand Rapids, Mich.
Taylor, N. G., Weedsport.
Taylor, Thomas E., Syracuse.
Ten Broeck, Edward B., Albany.
Ten Broeck, Walter L., Rhinebeck.
Ten Eyck, James, Albany.
Tenney, Mrs. Ellen L., Albany.
Terry, Guy, Fairmount.
Terry, Thomas H., Hempstead.
Thacher, George H., Albany.
Thacher, John B., Albany.
Thatcher, Jerry B., West Danby.

Thayer, Charles, Lyndonville.
Thayer, Charles I., Cooperstown.
Thomas, Asabel K., Amboy.
Thomas, George C., Waterloo.
Thomas, John, Frankfort.
Thomas, A. H., Syracuse.
Thompson, Frederick, New York.
Thompson, Lemon, Albany.
Thorne, Jonathan, New York.
Thorne, Oakleigh, Millbrook.
Thorne, Samuel, New York.
Thorne, William, New York.
Thorne, W. G., Skaneateles.
Thornton, P. S., Marcellus.
Tibbitts, Lester G., Guilderland.
Tiffany, Joseph, Medina.
Tillinghast, A. O., West Valley.
Tilly, Edwin, Memphis.
Tinkham, R. M., Barre Centre.
Tisdale, W. D., Cortland.
Titus, Charles M., Ithaca.
Titus, Seymour N., Weedsport.
Toll, T. M., Baldwinsville.
Tomes, Francis, New York.
Tompkins, Daniel D., Medina.
Tompkins, James, Albany.
Townsend, John D'P., Albany.
Townsend, Theodore, Albany.
Townsley, H. M., De Kalb.
Tracy, Benjamin F., New York.
Tracy, O. V., Syracuse.
Tracy, Charles, Ghent.
Traver, Fred. E., Rhinecliff.
Treadwell, George H., Albany.
Treichler, Henry B., Sanborn.
Treichler, Eli P., Sanborn.
Trowbridge, Miles L., Syracuse.
True, R. B., Syracuse.
Tryon, Howard, Fleming.
Tryon, Oscar, Auburn.
Tubbs, A. S., Mexico.
Tucker, Gilbert M., "Country Gentleman," Albany.
Turner, Benjamin, Horseheads.
Turner, David J., Horseheads.
Turner, Elisha R., Pope's Mills.
Turner, William, Edenton.
Turnure, David M., New York.
Tuthill, W. H., Canandaigua.
Tweddle, George, Baltimore, Md.
Tyler, Warren J., South Byron.

U

Umbrecht, Charles, Syracuse.
Underhill, Daniel, Jericho.

V

Vail, Theodore F., New York.
Van Allen, Edwin, Delmar.
Van Allen, Garret A., Albany.
Van Alstyne, Edward, Kinderhook.
Van Antwerp, Elmer H., Albany.
Van Benthuysen, Frank, Albany.
Van Buren, John P., Stockport.
Van Cleft, Joseph, Newburgh.
Vanderveer, Theodore B., Amsterdam.
Vanderveer, George Port Jackson.
Van Deusen, M. A., Canajoharie.
Van Dreser, Henry, Cobleskill.
Van Duyn, John, Syracuse.
Van Duzer, Jonas S., Horseheads.
Van Gorder, Robert B., Elmira.
Van Heusen, Theodore V., Albany.
Van Hoesen, Jacob, Van Buren.
Van Hoesen, John I., Castleton.
Van Horn, G. H. F., Fonda.
Van Horn, Abram, Fonda.
Van Horn, John S., Fonda.
Van Ness, Frank A., Baldwinsville.
Van Pelt, Henry, New York.
Van Schoick, Josiah F., Syracuse.
Van Valkenburgh, John L., Albany.
Van Vranken, R., Syracuse.
Van Wegenen, Jared, Lawyersville.
Varnum, James M., New York.
Varnum, Robert T., New York.
Vaun, Irving G., Syracuse.
Vick, Frank H., Rochester.
Viele, Maurice E., Albany.
Vilas, Calvin, Ogdensburg.
Vincent, M. J., Syracuse.
Von Herff, B., 93 Nassau street, New York City.
Voorhees, W. J., Baldwinsville.

W

Waddington, George, New York.
Wadsworth, Arthur, Camillus.
Wadsworth, James W., Geneseo.
Wadsworth, Charles F., Geneseo.
Wadsworth, J. H., Camillus.
Wadsworth, William A., Geneseo.
Wagstaff, Alfred, Jr., Babylon.
Wainwright, Charles S., Rhinebeck.
Waite, David, Otsego.
Walbridge, S. D., Rochester.
Wales, George S., Syracuse.
Wales, Walter S., Syracuse.
Walker, C. E., Corning.
Walker, Wallace, Auburn.
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Walling, William H., Potsdam.
Walter, John A., Stiles Station.
Ward, Frank D., Batavia.
Ward, Samuel B. (M. D.), Albany.
Ward, William L., Port Chester.
Wardwell, Henry L., Springfield Centre.
Warner, Charles M., Syracuse.
Warner, Daniel D., Canaan.
Warner, John H., Niskayuna.
Warner, J. Hobart, Hoosick Falls.
Wasson, James D., Albany.

Waterbury, Isaac C., Syracuse.
Watson, H. M., Buffalo.
Watson, H. R. C., West Farms.
Wayne, James, New Scotland.
Webber, Aaron A., Nassau.
Webster, Milo F., Victor.
Webster, William A., South Hammond.
Weed, William H., New York.
Weed, William R., Potsdam.
Weed, William W., Potsdam.
Welles, John C., Elmira.
Welles, M. H., Elmira.
Welles, Euguene, Rhinebeck.
Wells, A. J., Syracuse.
Wells, Edwin M., Syracuse.
Wells, George E. Syracuse.
Wells, George M., Big Flats.
Wells, Harrison, Cortland.
Wells, J. Emmett, Syracuse.
Wells, John E., Onondaga.
Wells, Thos. M., De Kalb Junction.
Wemple, Edward, Fultonville.
Wemple, Robert, Fultonville.
Wende, B. A., Alden.
Wende, Charles C., Alden.
Wende, H. S., Tonawanda.
Wendell, Burr, Cazenovia.
West, E. K., Syracuse.
West, George, Ballston Springs.
Westfall, James, Syracuse.
Westfall, O. J., Faimount.
Westgate, Clement, Liverpool.
Westlake, John F., Horseheads.
Wetherbee, Ansel, Barre Centre.
Wetmore, Benjamin C., New York.
Wetmore, W. H., Syracuse.
Weyant, George H., Weedsport.
Whedon, Ezra, Jr., Fairmount.
Whelan, Michael, Syracuse.
Wheeler, Charles L., Cherry Creek.
Wheeler, G. H., Hammondsport.
Whipple, Watson U., Medina.
Whitbread, T., Syracuse.
White, A. H., Medina.
White, Douglas L., Albany.
White, Horace K., Syracuse.
White, Hugh, Utica.
White, H. L., Utica.
White, Hamilton S., Syracuse.
White, John J., Albany.
White, Rufus P., Adams.
White, William P., Utica.
Whitnall, T. S., Syracuse.
Whitney, Cheney P., Orleans.
Whitney, James W., Rochester.
Whitney, James, Horseheads.
Whitney, N. Prentice, Morley.
Whitney, William M., Albany.
Whitney, William M., Jr., Albany.
Whittleton, Benjamin A., Medina.
Wiard, W. W., Syracuse.
Wicks, J. W., Syracuse.
Wickwire, F. H., Cortland.
Wickwire, C. H., Cortland.
Wier, H. C., Sugarloaf.
Wright, R. A., New York.
Wilber, Calvin C., Fairmount.
Wilber, D. F., Oneonta.
Wilbur, Charles V., Fairmount.
Wilbur, Fred. V., Fairmount.
Wilbur, Royal P., Lowville.
Wilcox, Aurin, Corning.
Wilcox, A. B., East Carlton.
Wilcox, A. F., Manlius.
Wilcox, B. M., Auburn.
Wilcox, C., Baldwinsville.
Wilcox, C. A., Syracuse.
Wilcox, Cyrus C., Oswego Falls.
Wild, W. H., Valatie.
Willard, G. L., Cold Spring Harbor.
Willard, Samuel D., Geneva.
Willers, Diedrich, Jr., Varick.
Willetts, J. C., Skaneateles.
Willetts, William R., Skaneateles.
Willey, B. F., 100 Herkimer street, Syracuse.
Williams, Charles F., Middleport.
Williams, Harold P., Grant.
Williams, Henry J., Grant.
Williams, J. E., New York.
Williams, John S., 54 Goodell street, Buffalo.
Wilbur, Frank L., Fairmount.
Wilson, Catlin, New York.
Wilson, J. C., Morley.
Wilson, Jesse B., De Peyster.
Wilson, L. Howard, De Peyster.
Wilson, T. B., Hall's Corners.
Wilson, Thaddeus L., De Peyster.
Windholz, L., Syracuse.
Wing, H. H., Ithaca.
Wing, J. Morgan, New York.
Wing, John D., New York.
Wing, L. Stewart, New York.
Winter, Mrs. J. C., 10 Madison street, Syracuse.
Witherhead, John, Ogdensburg.
Witherhead, George H., Ogdensburg.
Wolcott, C. E., Syracuse.
Wolfe, N. H., New York.
Wood, Amos F., Mason, Mich.
Wood, Frank M. J., Albany.
Wood, George M., Woodville.
Wood, James, Mount Kisco.
Wood, John E., Middletown.
Woodford, Francis T., Utica.
Woodruff, Franklin, Brooklyn.
Woodruff, Hon. Timothy L., Brooklyn.
Woodward, J. Milton, Lockport.
Woodward, James OI., Albany.
Woodward, James O., Albany.
Woodworth, Augustus P., New York.

Woodworth, Amos L., Fulton.
Wooster, Chas. A., North Hammond.
Worden, Byron, Oswego.
Worden, Stewart, Syracuse.
Wormuth, George B., Stiles Station.
Wright, George W., New York.
Wright, James, Weedsport.
Wright, Merytt M., Lamsons.
Wright, R. B., Lyndonville.
Wright, Solon D., Hammond.
Worker, Hamlet, Syracuse.
Wurtz, Charles Stewart, Philadelphia, Pa.
Wyckoff, E. G., Ithaca.
Wynkoop, J. G., Syracuse.

Y

Yale, J. W., Syracuse.
Yates, Harry, Rochester.
Youmans, William, Delhi.
Young, Calvin, Auburn.
Young, Charles W., Syracuse.
Young, George, Utica.
Young, S. W., Weedsport.
Young, Eugene C., 709 Third street, Syracuse.
Youngs, J. R. (M. D.), Liverpool.

Z

Zettwick, Louis, Syracuse.
Zimmerman, J. A., Syracuse.

Annual Meeting.

The annual meeting of the New York State Agricultural Society was held in the lecture room, Agricultural Hall, Albany, N. Y., on Wednesday, January 17, 1900, at noon, and was called to order by the president of the society, Hon. Timothy L. Woodruff.

PRESIDENT'S ADDRESS.

Gentlemen of the New York State Agricultural Society—This society has been holding its annual sessions for the past 60 years, with special appropriateness, here in the capital city of the State. From all parts of the commonwealth the representatives of the vast agricultural interests of the rural counties have on these occasions been assembled. Over these meetings have presided great landed proprietors, famous statesmen, and the most public spirited men of the period. Of the extent to which I have been honored by this venerable and honorable society, over whose deliberations to-day it is my privilege to preside, in the chair made illustrious by so many eminent predecessors, I am profoundly conscious.

When I was elected last May as your president, to fill the unexpired term of the late lamented Governor Roswell P. Flower, it was on the eve of my departure for a two months' absence abroad, but immediately upon my return I took steps to familiarize myself with the financial and administrative affairs of the society.

In relation to its financial condition, it transpired that the society was in debt about $20,000, the liquidation of which had, however, been provided for by a State appropriation, which was to become available when the property of the society should be transferred to the State. The total amount of this appropriation was $35,000, to be used for the construction of an additional exhibition building, after the debts and current expenses were paid. In addition to this $35,000 there was available the usual sum of $22,000 for premiums, making a total sum of $57,000 appropriated by the State. To my surprise, it appeared that no income whatever was derived through annual dues or any kind of assessment from the sixteen hundred members of the society, but that, on the contrary, they were accorded free admissions and free entries. I only refer to the present aspect of this subject, for I am not unmindful of the fact that these life members paid to become such and enjoy the privilege of free entries and admissions the sum of $10 each. The receipts from this course, however, had been long ago expended. In addition to such support as the State and the members of the society might render, there was no other income to look for, except that furnished by the receipts of the State fair itself. Great, indeed, was my surprise when I learned that the gate receipts in 1898 had been only about $16,000. Why, the receipts of the State fair held in 1850, half a century ago, were over $19,000, and many are the county fairs which yield more than the State fair's receipts have recently amounted to.

Upon paying a visit of inspection to the fair grounds, I was disappointed to find stubble fields where green lawns should be; paths of cinder instead of a less disagreeable material; a total absence of shade trees and even ornamental shrubbery, no floral decorations of the grounds worthy of consideration, and all the buildings sorely in need of a coat of paint for the purpose of preservation and attractiveness. The race track on this, the State fair grounds, to my surprise, was only a half mile track, and the inclosure and paddock far from inviting to the eye or the comfort of the spectator.

It was perfectly apparent why these conditions existed—the managers, who appreciated more than anyone else, the necessities of the care, instead of having a surplus out of which to defray the expense of correcting these conditions and making necessary improvements, as a matter of fact had to face a big deficit every year. I want to say right here, however, that the interest and energy displayed by the officers and by the members of the executive board was exceptional and worthy to be crowned with success.

Horse racing had, by a resolution of your executive board, adopted just before the death of Governor Flower, been eliminated from the programme of the fair of 1899. Other performances, which it was thought would attract the public, had been contracted for as a substitute. I do not understand that any of the present officers of the society were or are opposed to properly conducted horse races. I certainly am not, but, on the contrary, strongly favor the building of a mile track in order that we may have the fastest and most attractive trials of speed to be witnessed anywhere in the United States.

As soon as possible after my return from Europe in July, about six weeks before the fair was to open, we set to work to secure, if possible, the exhibition of some of the best types of carriage horses owned in New York city and elsewhere in the State. Our intention was to initiate what we hoped another year would develop into a horse exhibition of such a character as would encourage the production of better animals and furnish instruction to the stock raisers of the State, and at the same time constitute an attraction which would increase the attendance. Unfortunately, we found that the date of the State fair was the same as that of the Newport horse show, and therefore we were unable to secure the attendance of any large number of the best horses. In spite of this, we did show about a dozen famous prize winners of the New York horse show of the winter before, in single, double, tandem and four-in-hand harness. By this initial effort we aroused the interest of a score of the most ardent lovers of horses in New York city, who now constitute the nucleus of a large body of horsemen who will send their horses to Syracuse next year if proper inducements are offered. Such an exhibition of horses of the highest action, the most perfect conformation and the best manner of going, bringing as they do, very high prices, would encourage the farmers and stock raisers to breed a better class of horses for sale in the large cities of the State.

It was my privilege to spend the entire week in constant attendance at the fair. I was impressed with the excellence of the location of the fair grounds because of their accessibility to the city of Syracuse, with its admirable hotels, and because of the delightful driveway along the shores of Onondaga lake, by which they are approached.

These extensive and admirably located grounds and buildings are now the property of the State. To be sure, they need the attention of the landscape gardener and the services of the painter. They require an additional entrance and above all a mile track. All that is needed to make them beautiful and perfectly adapted to their purposes will not require a large expenditure, certainly not nearly as large as the benefits that will be derived.

Taking advantage of Governor Roosevelt's presence, I had the pleasure of gathering together at the Yates house on the evening of the last day of the fair, in addition to the Governor himself, and the executive board of the society, many of the most prominent citizens of Syracuse and several members of the Legislature who were in the city. Many hours were spent on this occasion in an earnest and most satisfactory interchange of opinions as to why the State fair had lapsed into its present condition, and as to what ought to be done to develop interest in it.

Subsequently meetings of the executive board were held, and as a result of the light thrown on the subject by the expression of opinions of those who had visited the fair and those who had attended the dinner to which I have referred, it was resolved that as the property belonged to the State, and as the State supported the fair, the natural thing was for the State to manage the fair. The Governor has recommended this in his message to the Legislature, and as far as I know, the members of the Legislature who have given special attention to the society's affairs in the past are now prepared to carry out this recommendation.

Among the reasons advanced for State control of the fair, in addition to those which I have already referred to, and why it is believed such a change will bring about a rehabilitation of what ought to be the greatest agricultural exhibition in the United States, are the following:

First. The State's control would lead the county fairs to avoid conflicts of their dates with the State fair.

Second. The State could induce the County Fair Association, which has heretofore been in conflict with the State fair, not only in dates, but in spirit, to co-operate with and contribute to a great agricultural exposition held under State auspices.

Third. The State would, by the substitution of its control for that of individuals, obviate any trouble arising out of the awards of prizes and premiums, and thus induce a complete unification on the part of exhibitors.

Fourth. The State's control would insure confidence, infuse new life into competition between exhibitors and arouse the interest of the people of the State.

In conclusion, permit me to say, that I have, in these remarks, dealt only with existing conditions and the means necessary to improve them. It would have been pleasanter, if less practical, to have expatiated on the vast importance of the agricultural interests of the Empire State. I fear I have failed to live up to Mr. Willard's introduction of me on the fair grounds last September, when he said I had been born and reared on a farm. Nevertheless you have my earnest wishes for the achievement of the greatest possible success. I have given to the consideration of this society's future the best that I had in me. I will be at all times and under all considerations responsive to any demands to which I have the ability to respond.

Mr. Fred C. Schraub offered the following resolutions, which were unanimously adopted:

Resolved, That it is the sense of the executive board of the New York State Agricultural Society. That it is for the best interests of the agriculture and horticulture of the State, that from this time the State fair and its affairs shall pass under State management and that legislation shall be adopted to that end. That this board recommends to the annual meeting, the passage of the following resolution:

Resolved, That the executive board having adopted a resolution that in their opinion, for the best interests of the agriculture and horticulture of the State, its annual State fair should pass under Sate management, and that legislation should be adopted to that end.

Resolved, That the president of the society appoint a committee of nine, of which he shall be a member and chairman, for the purpose of presenting the whole question of State management and doing necessary legislation to that end, to the Governor and the Legislature.

Resolved, That when this meeting adjourns it be to March 21, 1900, at 12 noon, at this place, and that the annual election of officers be deferred to that time.

The president appointed the following named committee in accordance with the resolution:

President Woodruff, Messrs. H. S. Ambler, A. W. Litchard, W. Judson Smith, Fred C. Schraub, S. D. Willard, P. W. Cullinan, J. H. Durkee, E. B. Long.

Mr. James Wood offered the following resolutions, which were unanimously adopted:

Resolved, That the New York State Agricultural Society expresses its profound appreciation of the loss sustained in the death of its honored president Roswell P. Flower, and regrets that there has been no earlier moment since this sad occurrence when it has been possible to make this expression.

Resolved, That it is not only in connection with the interests of this society that great public loss has been sustained by the death of Mr. Flower, but the members of this society, as citizens of the State, deeply realize that the State has lost a very distinguished citizen who had served the commonwealth to its great benefit and with much credit to himself. He always had the courage of his convictions and performed his public services with admirable energy.

Resolved, That the society directs that these resolutions be printed in its annual report, and that a copy of them, duly signed by the president and secretary, be forwarded to the family of the deceased.

Mr. S. T. Betts offered the following resolution, and it was unanimously adopted:

Resolved, That it is the sense of this meeting that the New York State Agricultural Society, which was incorporated in 1832, and which has ever since exerted a wide influence in this great Empire State, be continued as said organization; but that if it seems expedient and wise by the society that the future direction of its affairs be placed under State management that this action be taken by our organization, but that in case such a change of management does occur that the present membership of our society retain and enjoy the privileges of such membership as has been our privilege to enjoy up to the present period of our history, and that the charter of the said organization should not be repealed.

Mr. S. D. Willard offered the following resolution, and it was unanimously adopted:

Resolved, That an invitation is hereby extended to the officers of the American Pomological Society to hold their next meeting at Buffalo, N. Y., in September, 1901, during the fruit exhibition of the Pan-American Exposition, and that our secretary be instructed to send copies of this invitation to the president and secretary of said society.

The following resolution offered by Mr. E. B. Long was unanimously adopted:

Resolved, That section 8 of the Constitution be amended to read: Section 8. The Constitution may be amended by a two-thirds vote of the members attending any annual meeting.

After a general discussion and reading of report of executive committee, a vote of thanks was tendered president Woodruff for the able manner in which he had conducted the affairs of the meeting, and the meeting adjourned to March 21, 1900.

Reoort of the Executive Board.

Diary of weather and crops during the agricultural year of 1899.

NORTHERN COUNTIES.

April.—The season backward; rain needed; oats and peas being sown on highlands; much plowing done; winter wheat and grass doing well; fruit prospects promising.

May.—First part, grass and grain in good condition; seeding nearly finished; heavy frost on 3d and 4th. Middle of month, frequent rains, light frost but no damage; potato planting nearly finished; grass and winter wheat improving; weather favorable for growing crops. Latter part, corn nearly all planted; pastures good; potatoes up; apple prospects poor in Clinton county; winter wheat good.

June.—First part, light rains very beneficial; poor apple prospects; farm work well advanced; plowing for buckwheat begun; large acreage of oats and peas planted in Herkimer county; corn backward; light hay crop; rain needed. Middle of month, light showers beneficial, but too late to save hay crop; rye and winter wheat heading; corn and potatoes doing well; pastures good but short; winter wheat a light crop in Clinton county; tobacco setting well advanced in Oswego county; some fruit dropping. Latter part, haying in progress, clover and grass drying up; grain and corn looking well; early potatoes forward; all vegetation needs rain.

July.—First part, good growing weather; hay fair crop, other crops good; pastures improved; rain needed in Oswego county; oats drying up; apples very poor in many sections. Middle of month, very dry but favorable for haying; hay secured in excellent condition; corn and potatoes fine; apples, plums, and cherries light; crops generally good; grapes promise a large yield; winter wheat very heavy in Lewis county, and oats heading well; pastures fair. Latter part, haying finished; weather very warm and dry; pastures dried up; barley and oat harvest commenced; good crop; buckwheat and potatoes fine; gardens good.

August.—First part, severe drought has greatly damaged corn and late potatoes; many fields dried up; grain mostly cut and yield satisfactory; apples in many localities a failure. Middle of month, all crops suffering from drought; foliage drying; pastures poor; tobacco less than an average crop in Oswego county; forest fires prevalent in Lewis and Jefferson counties. Latter part, light rains have somewhat improved growing crops; corn, potatoes and apples below average.

September.—First, part, drought continues; light frost on 7th; corn cutting begun; yield unsatisfactory; potatoes better than expected, and crop will be average; apples very poor; hops only half crop in Oswego county. Middle part, frost on 14th, 15th and 16th; dry weather; pastures poor; much damage by forest fires in Jefferson county; corn and buckwheat damaged by frost on low lands. Latter part, good rains in most sections except in Oswego and Lewis counties, where considerable damage is reported from drought; considerable plowing done; wheat and oats being threshed with good yield of each.

EASTERN COUNTIES.

April.—Weather conditions during the middle and latter part of the month were generally favorable for farm work, but rain is needed to start vegetation; plowing well advanced; oat seeding begun and potato planting and gardening in general progress; spring work progressing rapidly; rye badly injured in some sections of Columbia county by unfavorable winter weather.

May.—First part, favorable; rains on 1st very beneficial; light frost on 4th and 5th, did no damage; oats up and looking well in Rensselaer county; corn planting begun and early potatoes planted; nearly all peach buds killed in Putnam county. Middle of month, frost on 14th and 15th, did some damage to early beans; weather cool, but farm work progressing; all grains looking well; fruit prospects promising; corn and potatoes being planted; gardens backward; pastures good. Latter part, rain on

20th put ground in fine condition for plowing and planting; corn, rye and meadows making rapid growth; oats looking fair; light frost on 22d, but no damage to fruit; strawberries and other small fruits looking well; rain badly needed in Dutchess, Putnam and Westchester counties; very poor prospects for hay crop; caterpillars numerous.

June.—First part, weather fine for work, but rain needed; all crops except hay look well; early planted corn being cultivated; good prospects for small fruits; rye and wheat heading finely. Middle part, crops suffering for rain; strawberries drying up; hay and oats poor; corn and potatoes fair; pastures short, ground very dry. Latter part, rains have revived vegetation somewhat, but more is needed; severe thunder storm on 20th in Rensselaer county destroyed many buildings and damaged crops considerably; hay crop light; corn and potatoes promising; fruit prospects poor; wheat fine; oats good; much rye cut; pastures short; small fruits abundant.

July.—First part, good rains on 6th and 8th; crops much improved; fine growing weather; berries seriously damaged in Albany county by drought; good crop of apples promised in Putnam county, crop light in other sections. Middle part, favorable weather for haying and harvesting all crops; corn and potatoes look well; late crops rapidly improving; hay a light crop; early potatoes unusually fine; a heavy yield of grapes promised in Dutchess county and full crop of apples in some sections. Latter part, more rain needed in Albany county; corn and potatoes suffering; oats ripe and ready to cut; haying about finished.

August.—First part, all crops need more rain; oat crop good; cabbage and tomatoes good; fruit, especially apples dropping; pastures poor; hops poor in Dutchess county. Middle of month, fodder corn and buckwheat suffering very much for rain; light frosts on 13th and 14th; garden truck drying up; potatoes affected by rust; pastures failing. Latter part, seasonable weather, but more rain needed; corn and buckwheat good in Greene county; buckwheat poor in Albany county; seeding winter grain begun; hops improving in Dutchess county, and corn good; grapes and apples good and abundant in Putnam county; potatoes fair in Westchester county.

September.—First part, good rain on 2d in Warren county; dorught continues in other sections; fodder corn small; corn cutting begun; light frost on 7th; grapes almost a failure in Rensselaer county. Middle part, drought continues; streams drying up; frost on 14th, 15th and 16th; buckwheat light; small crop of apples in Washington county, but quality good; large crop of fine potatoes in Albany county and yield much better than was expected in Westchester county; ground too dry for plowing; corn cutting well advanced and crop generally good. Latter part, heavy rains in Dutchess county, but drought continues in other sections; corn and buckwheat about harvested.

WESTERN COUNTIES.

April.—Plowing being rapidly pushed; some oats and barley sown; early sown wheat looks well; fruit prospects good; considerable progress made in farm work; caterpillars appearing in large numbers in Ontario county. Latter part of month, rain needed.

May.—First part, cherries, peaches, plums and pears in full bloom; apple prospects less promising; good rains in Monroe and Wayne counties but rain badly needed in other sections. Middle of month, frost injured strawberries in Niagara county; rye, oats and wheat looking well; pastures good; but little corn planted; weather generally cold and wet. Latter part, fair growing weather; grass and grains looking fine; early potatoes up; tent worms doing much damage; farmers preparing ground for beans; corn mostly planted; new clover seeding small in growth; light frost on 25th but no damage reported; apples set well where trees have been sprayed; a fair crop of peaches promised.

June.—First part, rain needed badly; fruit prospects continue promising, except for apples; light hay crop; wheat heading; potato and bean planting finished; corn and other crops making rapid growth; silo corn has not come up well and much has been replanted; hops fine in Ontario county. Middle part, apples and pears dropping; peach prospects continue good; canker worms appearing in some orchards; rain on 14th and 15th but more needed. Later part, haying nearly completed; crop light; weather continues very dry; barley and oats poor in Niagara county; corn and potatoes looking well; cherries plentiful; grapes very promising; apple crop light; peaches on the lake will be a large crop.

July.—First part, wheat harvest well under way; corn doing well; fine showers very beneficial, and all vegetation improved; potatoes look well. Middle part, plentiful showers have improved all crops; wheat harvest finished and threshing begun; yield, average; quality good; oats improved; pastures good. Latter part, weather favorable although more rain is needed; corn good; some oats cut; beans ripening; apple prospects somewhat improved.

August.—First part, drought continues; light yield of wheat and oats in Niagara county; blight injuring potatoes in Orleans county; buckwheat, corn and beans need rain badly; plowing in progress; garden truck nearly a failure in Wyoming county; pastures drying up and wells failing. Middle part, apples dropping badly; plums plentiful; beans below average crop; too dry for plowing; drilled corn poor; no rain and crops suffering; no pastures for stock. Latter part, drought continues and crops and fruit suffering.

September.—First part, small truck and late crops improved by rains; apples dropping badly; corn about one-half crop in Niagara county; light frost on 6th and 7th. Middle of month, dry weather; but little grain sown; corn cutting rapidly advanced; light frost on 14th, 15th, 16th; damage slight. Latter part, drought broken on 19th; grass making good start; wheat seeding about done; apples not abundant but of good quality; potatoes light, also buckwheat; grapes very good.

CENTRAL COUNTIES.

April.—Wheat looking well; farm work progressing; oats mostly sown. Later part, weather favorable; plowing well advanced; fruit prospects good; tent caterpillars hatching in great numbers; hops looking fine in Otsego county.

May.—First part, vegetation vigorous; wheat and grass looking well; sowing about finished; dry, cold weather unfavorable for tobacco in Onondaga county; caterpillars in large numbers on apple trees. Middle part, grape vines injured by frost in Yates county; young clover killed by dry weather; wheat and grass looking well; corn planting delayed; weather unfavorable; new hop yards looking fine. Latter part, potatoes being planted; corn up; wheat heading; oats and barley doing well; fruit prospects good; weather fine for growing crops.

June.—First part, rain badly needed; Hessian fly damaging wheat; hay light; poor prospects for grass. Middle of month, rains of great benefit to corn and spring grain, but too late for hay; seventeen year locusts appearing in large numbers; tobacco plants set; hops in new yards good; in old ones thin. Latter part, grapes look fine; corn doing well; potatoes poor in some sections of Yates county; haying general; rains on 28th helped crops.

July.—Rains in early part of month beneficial; wheat havesting begun; fruit crop light; corn and potatoes looking well; oats light. Middle of month, wheat mostly cut; all crops show marked improvement; corn doing well; garden truck fine; hay crop better than expected in Otsego county; hops much improved and in bloom; barley ready to cut and oats ripening fast.

August.—First part, great damage by hail storm in Yates county; oat harvest finished; some plowing being done; crops generally damaged by dry weather; apples dropping badly; tobacco fine; wheat yielding well; hops good in some sections, but crop generally below average. Middle of month, hail storm on 12th greatly damaged grapes; beans, potatoes and corn promise an average crop; buckwheat looks well; plums will be a good yield; apples average. Latter part, showers very beneficial; grape shipments begun; buckwheat and corn improved; also pastures; plowing in progress; tobacco cutting progressing, crop above average, some very fine; lice damaging hops, and crop will be below average.

September.—First part, corn cutting begun; ground very dry and plowing delayed; apples dropping badly; streams very low; rain much needed. Middle part, light frost on 14th, 15th and 16th; no damage; outlook for grapes very fine; seeding delayed by dry weather; corn cutting progressing; potatoes good in Onondaga county; silo filling well advanced. Latter part, apple picking in progress, fair crop in Yates county; light rains on 20th and 21st; buckwheat cut; corn harvested; fair crop of potatoes; streams and springs are at their lowest point; fall feed scarce; wheat seeding in progress but delayed by drought.

SOUTHERN COUNTIES.

April.—Wheat and grass looking well and growing rapidly; weather favorable for seeding; fruit prospects good. Latter part of month, more rain needed.

May.—First part, warm and season about normal; early peas and potatoes up; grass growing vigorously; oat seeding nearly finished; farm work well advanced; rain needed. Middle of month, weather unfavorable, cold and wet; light frost on 15th; snow on 19th and 20th in Chautauqua county. Latter part, plenty of sunshine has given corn a better color; rains very beneficial; all fruits look well; winter grain above the average.

June.—First part, weather favorable for farm work and growing crops; hay crop will be short; worms destroying maple trees in Allegany county; grapes setting full. Middle of month, buckwheat sowing begun; cherries ripening and promise large yield; oats, corn and potatoes look well; pastures fair. Latter part, weather conditions favorable; crops generally looking well; rain on 28th very beneficial; haying nearly completed, crop light.

July.—First part, more rain needed; pastures drying up; apples dropping badly; hay a fair crop in some sections, but generally light; corn and potatoes doing well. Middle part, severe hail storm in Cattaraugus county on 17th; much damage to corn and grain; weather generally favorable; pastures excellent in Orange county; potatoes growing rapidly; buckwheat, corn and oats doing well. Latter part, showers keep vegetation fresh; corn, fine; peas and beans large yield; pears and apples fair.

August.—First part, weather very dry; wheat, rye and oats yielding well; corn and potatoes need rain badly. Middle of month, warm and dry; crops suffering; pastures poor; light frost on 15th. Latter part, fine rains and all crops greatly improved; potato rot reported in Delaware county; hop picking well under way.

September.—First part, wheat seeding in progress; pastures and after feed improved; fair crop of corn; potatoes a large yield in Orange county; grapes heavy, and peaches and apples of good quality. Middle of month, weather unfavorable; freezing temperature on 14th and 15th in Chautauqua county and Cattaraugus county. Latter part, late corn injured by frost; fall feed good; wheat seeding completed, and some winter grain up in Orange county and looking fine.

LONG ISLAND.

April.—Plowing retarded on account of drought; wheat, oats and grass looking well.

May.—First part, rye well advanced; a large acreage of potatoes planted; winter grain doing well; some corn planted; fruit prospects good. Middle of month, weather cold and cloudy; grass needs rain; potato bugs making an appearance; potatoes and corn up. Latter part, very dry; hay crop will be short; grain looking well.

June.—First part, strawberries drying up; light hay crop; early pea crop a failure; all crops suffering for want of rain. Middle part, wheat and rye fair; hay crop a failure; strawberries poor; corn doing finely. Latter part, rye about harvested; cabbage setting going on rapidly; potatoes improved; showers on 25th and 28th.

July.—First part, dry weather continues; harvest nearly finished; wheat good; oats fair; corn and potatoes looking well. Middle part of month, cool and fair; oats nearly ripe; wheat harvest completed; heavy shower on 12th. Latter part, plentiful showers; late potatoes doing well; cabbage and tomatoes growing rapidly.

August.—First part, potatoes very fine in places, but generally below average; large crop of corn; pastures greatly improved; all crops doing well. Middle part, large yield of sweet corn; cabbage and cucumbers fine; rain needed. Latter part, grapes fine; pickle crop ruined by drought; peaches poor; good yield of potatoes.

September.—First part, some showers, but more rain needed; apples poor; peaches good. Middle part, heavy rain on 11th; light frost on 14th; no damage. Latter part, plenty of rain; garden truck good; some wheat sown; heavy yield of potatoes in Suffolk county; pastures much improved.

REPORT OF SPECIAL MEETINGS.

The past year, in some respects, was the most memorable in the history of the society. At our last annual meeting the society elected Hon. Roswell P. Flower, ex-governor of the State, president. On May 9th a meeting of the executive board was held in Mr. Flower's office in New York city.

President Flower presided at this board meeting and was apparently in excellent health and spirits. He gave most hearty support to plans for the interest of the society and the benefit of the State fair. Three days after this meeting the news of the sudden death of Governor Flower was flashed over the country. Sad news for your committee and indeed for the country at large.

We will not now speak of the life-long services of the warm-hearted philanthropist, agriculturist, banker and true Christian gentleman who so suddenly departed from our midst. We will only say that the New York State Agricultural Society lost a sincere friend and the farmers of the country one of their staunchest supporters when Governor Flower died.

Your committee at the meeting May 9th, after careful consideration and due deliberation, in accordance with the provisions of section 2 of the laws of 1871, unanimously passed the following resolution:

Resolved, That in order to conform with, and pursuant to the provisions of the appropriation act of 1899, now in the hands of the Governor for his approval, whereby the sum of thirty-five thousand dollars is appropriated for the New York State Agricultural Society, in which it is provided that no portion thereof shall be paid over to this society, or on behalf thereof, until it shall have transferred to the State of New York all the right, title and interest of this society to all its lands, reserving the use and occupation thereof as long as it shall annually hold or maintain a State fair; therefore, be it

Resolved, That the president and secretary be and they are hereby empowered to sell and convey to the State of New York all the right, title and interest of the said New York State Agricultural Society in and to all the lands now owned by this society in the county of Onondaga, reserving the use of said land to this society so long as it shall annually hold or maintain a State fair. The authority hereby conferred shall not be exercised until after the Governor shall have signed the act allowing said appropriation, and said transfer shall be subject to any bonded indebtedness of this society which may be a lien upon the land so transferred, and in all things according to the provisions of said appropriation act.

The appropriation of $35,000 was incorporated in the annual supply bill and met the approval of the Governor. A deed was prepared and executed, transferring to the State the rights and interests of the society in the State fair grounds at Syracuse, reserving to the society the use of the property as long as the society shall hold an annual State fair upon the grounds.

Your committee met in Syracuse on May 20th and elected Hon. Timothy L. Woodruff to succeed president Flower. Mr. Woodruff consented to act as president and, in consultation with your committee, cordially indorsed all plans for the future welfare of the society.

He was obliged to leave for Europe shortly after his election but he returned in time to take an active part in the management of the State fair, introducing new features which will undoubtedly tend in the future to make the State fair a great educational object lesson for the agriculturist and stockman.

THE STATE FAIR.

The State fair of 1898 received such high commendation from the agricultural press of the country, from exhibitors and the public generally that your committee endeavored to follow the same general plan in arranging for the fair of 1899, and to make it, if possible, the best fair ever held by the society.

If the success of the State fair is to be measured by the number of visitors in attendance during the week, then our last exhibition has been excelled, but if superiority in number and quality of exhibits in the various departments and consequent value as educators, purity and cleanness count for anything, then the New York State fair of 1899 took another step in advance of all previous records.

It is very gratifying to your committee to be able to come before you and say that in number and excellence of exhibits, last year's fair was, in all respects, equal, if not superior, to any fair ever held under the auspices of the society.

It was emphatically an agricultural fair, a fair for the farmer, horticulturist, orchardist and stockman, free from any and every objectionable feature. A fair that our people could attend with their wives and children with pleasure and profit.

Much talk and adverse but unjust criticism resulted from the radical action of your board in eliminating, for one fair, the racing department. The meeting last spring at which this action was taken was a unit in its determination to shut out, so far as possible, features which were not only demoralizing but unlawful. Many words of disapproval had come to us regarding the manner in which our racing department had been conducted.

Early in the spring the question of the advisability of having races during State fair week came before your committee. Many complaints had been made in the past in regard to this department. It was claimed that surreptitious pool selling and betting were indulged in, to the demoralization of young men; that the horses competing in these races were of a class offering no points of interest or profit to the breeder who came to the fair to learn something of value in his own special line, and that the expense attending this department was entirely out of proportion to the returns therefrom.

All these points were considered at a meeting of the executive board, and it was finally concluded that it would be for the best interests of the society to have no races at the fair, but to substitute a really first-class horse show—an exhibit of highly bred and trained carriage, harness and saddle horses; horses whose conformation, breeding and training would show what intelligent methods might produce.

Should it be deemed wise in the future to have races during the fair, your committee would suggest that only first-class horses, horses famous for speed, be permitted to enter, and that the purses offered should be sufficiently liberal to induce the owners of such horses to attend.

First-class vaudeville performers were engaged to give performances every afternoon in front of the grand stand, and Pain's celebrated exhibition of fireworks for the evening.

As the State fair opened on Labor day, Monday, September 4th, it was decided to have all exhibits on the grounds and in place by 9 a. m., so that visitors, particularly the members of the trades unions, might find the fair in full operation and not in a state of preparation, as the opening days of the fair have generally been.

Exhibitors were notified to that effect and all complied with the regulation. Everything was in readiness in the morning, and the attendance during the day was far in excess of that of any previous opening day. The weather was cool and pleasant, and we may say that favorable weather conditions prevailed generally throughout the week, with the exception of Governor's day, when it rained heavily in the morning.

The admission fee for that day (Labor day) was made 25 cents. As an additional inducement to the trades unions to hold its annual outing on the fair grounds, and to do its share of advertising the event and otherwise helping to make the day a success, that organization received a percentage of the gate and grand-stand receipts; and it is gratifying to note that the labor committee, representing the trades assembly, reported to us that never before, except once, in the history of their organization, had the cash receipts for Labor day been so large or the expressions of interest and pleasure on the part of members so general. The experiment of opening on Labor day was a pronounced success, both for the fair and its visitors.

Let us take a general survey of the buildings and grounds on the opening day. Commencing with the main building, we find the merchants' booths beautifully decorated and filled with choice specimens of their commodities. The space allotted to the ladies for fancy work and domestic manufactures entirely filled with elegant specimens of their handiwork; the hand-painted china exhibit was exceedingly beautiful, showing excellent samples of new Berlin, jewel and paste work, also fine specimens of needle-work and hand-made lace. A booth which attracted much attention, both because of its novelty and the work it contained, was that of the State Institution for the Blind at Batavia. The exhibit included machine and hand sewing, weaving, bead work, etc. The walls of the art gallery, adjoining the ladies' department, were covered with nearly 200 oil and water color paintings, many of them being of great excellence, and the whole forming a show by themselves equal to many of the art exhibitions given yearly in our large cities. Passing through this building we come to the Greater New York exhibit, under the management of Mr. G. W. J. Angell of the Merchants' Association of New York city. This feature was introduced at last year's fair, and will in the future be a most important one. Unfortunately, our space was limited and we were unable to accommodate many firms anxious to send goods.

We hope that the society may be able to erect a new main building next year, so that ample room may be found for all. As it was, every available inch of space was occupied in our main building, and we were compelled to refuse many applications for room. Between the main bulding and floral hall the space, comprising several acres, was covered with exhibits of agricultural implements and machinery—the largest and best show of the kind ever made on the grounds. The exhibits in this important department have steadily increased in number and attractiveness from year to year, and your committee strongly recommends that every possible inducement be offered to manufacturers to pursuade them to attend our annual State fairs.

We now enter the farm produce department. Here we find a grand display of grain, vegetables, bees and honey, the entire wing of floral hall being given to this purpose and all space occupied. The center of the building, and indeed of attraction, was floral hall. The large dome and walls were tastefully draped with flags and bunting, forming a chaste and beautiful frame work for the gorgeous display of palms and flowers of every description which completely filled the building.

One of the most attractive exhibits at the fair, was that of live fish by the State Fisheries, Game and Forest Commission under the direction of Commissioner William R. Weed. The exhibit comprised various species of fish, principally brook, brown, rainbow, lake, steel head, red throat trout, black and white bass, pike, perch, pickerel, etc.

The fish tanks were placed in floral hall under the dome, beautifully decorated with ferns and flowers, the tables supporting the tanks were trimmed with flag bunting which increased the attractiveness and beauty of the exhibit. A particular feature of the exhibit was the large size of the trout family, several of the brown and rainbow trout weighing 8½ to 11 pounds. We trust the fair will next year have the co-operation of the Commission to the end that they will make another exhibit.

The collection of insects, also under the dome, placed on exhibition by the Entomological Department of the State Museum, was surrounded most of the time by groups deeply interested in learning about the more important pests they have been obliged to fight so long. The exhibit, contained in twelve glass covered cases, consisted of over 100 species of the more injurious and beneficial insects, and its value was still more enhanced by the brief catalogue giving the more important characteristics of the forms listed, and outlining in a word the method of controlling them. Nearly 2,000 of these catalogues were distributed, and this number represents only a small proportion of those who looked at the collection, for many, knowing little of its nature, were content with a glance or two. A member of the office force was in attendance for the purpose of answering inquiries. The value of this department was very favorably commented upon in the agricultural and local press. As agriculturists have little opportunity for visiting museums or collections where special attention is given to insect pests, it was believed that showing farmers a properly arranged biologic collection, representing the various stages of the more important insect pests, their work and any peculiarities they may possess, would promote the general study of insects, thus leading to their better control. The attention given to the collection is strong testimony to the value of this work.

The floral display was not confined entirely to the building, many large and beautiful beds of growing plants and flowers were interspersed over the grounds, adding greatly to their appearance and calling forth much commendation from visitors. These beds were planted by exhibitors competing for the liberal prizes offered for such purpose.

We would like to linger in this delightful hall but the claims of the fruit department adjoining are pressing and we pass through the annex, filled to overflowing with the fruit exhibit of the State Experiment Station, to the main fruit building which is about 200 feet long and 40 feet wide.

Notwithstanding the great amount of space available in this hall, the executive officer of the department was scarcely able to find room properly to display the exhibits. About 8,000 plates were on the shelves, and every plate showed nothing but the choicest specimens of its kind. The beautiful colors of the ripe fruit vied in attractiveness with the flower show in the adjoining hall. The varying colors of different varieties contrasting most harmoniously A pyramidal frame 15 feet high, erected in the centre of the room and covered with clusters of grapes, was greatly admired. The fruit show has always been one of the most attractive features of our State fairs, and it was considered in 1898 that the limit had been reached and that it would be impossible to present a finer display, but do not hesitate to say that our last year's fruit exhibit surpassed that of any heretofore made, and we doubt if such a magnificent exhibition of choice fruit was ever presented at any place in the Union at any time. We desire to call the particular attention of exhibitors to the attractive design put up by the Western New York Horticultural Society, and urge upon them the advantage to be derived from adopting a similar form in future to display their exhibits.

The entire space given to the exhibit of butter and cheese in the dairy building was occupied, and we strongly recommend that an addition be made to the building to meet the requirements of this most important industry. The quality of the dairy products was excellent, as the expert judges' scores demonstrated. The dairy machinery portion of the building was crowded with separators, combined churn and butter workers, Babcock testers, etc., and, in fact, specimens of all the most improved dairy utensils.

The additional special prizes offered for collections in the poultry department were much appreciated by exhibitors, and caused keen competition. The fanciers were well aware of the fact that none but birds of the best quality and breeding could hope to win, and in consequence the show was a most magnificent one in point of excellence. In numbers also it was a great success, all the coops being filled. Of the live-stock departments we can only say that the high reputation of the New York State fairs for the superiority of their exhibits in these departments, made in the past, was fully sustained at the last fair. Full entries were made in all the departments, and the quality of the stock was, as usual, of the very best. The exhibit of horses was greatly strengthened during the latter part of the week by the addition of the competitors in the horse show, introduced by President Woodruff.

Breeds of cattle were represented as follow:

Short-horns 10, Devons 39, Herefords 20, Aberdeen-Angus 29, Brown-Swiss 36, Red Polls 21, Holstein-Friesians 110, Dutch Belted 13, Ayrshires 55, Jerseys 62, Guernseys 17, French Canadians 16; total 428.

Horses.—Clydesdales 7, Percherons 3, French Coach 16, Cleveland Bays 4, Hackneys 8, Standard Bred 40, Carriage and Coach 29, Draft 10, Shetland ponies 80; total 197.

Sheep.—Cotswolds 26, South Downs 43, Shropshire 98, Hampshire 39, Oxford Down 32, Cheviot 36, Dorset-Horn 13, Merino 76, Delaine-Merino 28, Leicester 16, Lincoln 7; total 414.

Swine.—Chester White 87, Cheshire 34, Poland China 33, Duroc Jersey 34, Yorkshire, Large, 34, Yorkshire, Small, 39, Berkshire 11, Essex 42, Victoria 17; total 331.

Poultry.—American 345, Mediterranean 203, Polish 87, Hamburg 70, French 24, English 42, Games 62, Oriental Games 43, Game Bantams 137, Bantams other than game 228, Ornamental fowls 68, turkeys 14, geese 46, ducks 92; total 1,461.

Farm produce, grain, vegetables, bees, honey, etc., 1,674.

Dairy, 275.

Domestic, fancy work and domestic manufacturers, 975; art, oil and water-color paintings, 178.

Flowers, 234.

Fruit, 1,912.

Agricultural implements and machines 190, making grand total of entries on exhibition 8,503.

FRUIT.

The season just passed will long be remembered by the fruit growing interest of this State as well as other States. The extreme cold so generally experienced throughout the State about February 1st to 11th, did great injury to the more tender varieties of fruit buds, while throughout the western States thousands of trees were entirely killed. This was doubtless due to an unusual lack of moisture in the soil and an absence of snow protection.

It is rarely that a season passes with so slight a rainfall from the opening to the close as that of 1899, and few indeed were the sections exempt from the drought that followed, the effect of which was to reduce to a minimum the hay crop and all spring grains and prevent the sowing of the customary acreage of wheat, which is by far the lightest put in in many years.

This absence of moisture, however, injurious to the ordinary farm crop was an important factor in producing the cleanest and most perfect crop of fruit grown in many years. Heat and moisture, so essential to all plant life, when in excess, particularly when the latter predominates, generates fungus, a disease dreaded by the growers of every kind of fruit, as nothing apparently is as immune from its devestating power; hence to the lack of conditions essential to its development may be attributed in a measure the excellent character of much of the fruit of 1899.

Strawberry plantations were severely injured by the winter's cold, as also were the buds of currents and gooseberries in exposed localities, so that the produce of each of these was far below the average.

A few days of rain during the blooming period of sour cherries prevented as heavy a setting of this fruit as in former years, but the crop matured in good shape and shipped to market in excellent condition, bringing satisfactory prices to the growers.

In the lake region, where the apricot has been growing in favor as a market crop, the crop was the largest and finest ever grown, and in favorable localities, from all that can be learned, it promises to become one of the leading fruit crops of the future.

The plum crop, while not equal in quantity to some former years was fine in quality and free from rot, but by reason of the heat and drought ripened somewhat prematurely, and required careful and quick handling to avoid loss. The same was true as regards both early and late pears, which in many instances required picking before maturity, to relieve the trees from a draft on their vitality that promised great injury.

The peach crop, while limited to favored localities, was in the main of excellent quality, sold at high prices and gave rich returns to the growers. It is certainly, on land adapted to it, one of the most profitable fruit products in the State. A very heavy frost in October, however, did great injury to late ripening sorts, rendering many of them worthless, and it is possible may have impaired the keeping qualities of quinces and late varieties of pears.

Quinces were especially fine and unexcelled by any crop ever before grown in this State, and when marketed early afforded profitable returns, while the later shipments failed to handle well and decayed badly.

The apple crop was not general, and it is a matter of question whether many of those engaged in growing this fruit cannot afford to give their orchards better care and culture. Certain it is that a larger portion of the paying crops of apples the past season were produced by those who have the reputation of being most liberal in their treatment of their trees. The quality of the fruit as a rule has never been excelled and the apple is rapidly coming to be regarded as the most valuable of all farm crops. It has been estimated that in seven counties alone this crop the past season has given returns of about $5,000,000.

As shown at the State fair the exhibit was without parallel, an object lesson worthy of study and the admiration of all who saw it.

The very rapid increase of all insects injurious to fruit has become a source of anxiety to all engaged in its production, and certainly demands serious consideration and intelligent action upon the part of the growers, as well as the hearty co-operation and support of the Legislature, of any measures advocated by the Department of Agriculture, in caring for an interest, the value of which has never yet been justly appreciated, but which is becoming paramount to all other land products of the State.

HOPS.

We regret that we are again obliged to note the unhealthy conditions which continue to surround this industry, and the manifold obstacles encountered by the growers in their efforts to bring the business back to a paying basis. Statistically the conditions never seemed more favorable for them than at the beginning of last season's campaign. Old stocks were well cleaned up through the channels of home consumption and export trade. All manufacturing industries were showing a rapid, healthy growth, with a large increase of output, with corresponding increase of prices. There was a strong demand for labor, both skilled and unskilled, at relatively high wages. The western farmer had been enjoying two years of advancing prosperity, while the eastern dairymen had at least for one season received encouragement in the line of better prices as the results of the general prosperity which seems to have come to our nation.

The opening of the yards in the spring with a good, strong start of the plants were assurances that the severe weather of the preceding winter had done but little injury. The early growth of the plants was rapid, the vine strong and healthy, and the general conditions seemed very favorable, until the first week in June. The very extreme hot weather of that period seriously scalded the young and tender vines, which not only checked their growth, but ultimately resulted in the permanent injury of the crop, as this set-back was followed by a long and severe drought, from which the yards could not recuperate, owing to their previous weakened condition. The attack of the hop Aphis just before the commencement of the harvest was quite general throughout the State, and very severe in some districts.

From statistics and best estimates obtainable the crop was about 50,000 bales, which is 2,000 bales less than the crop of 1898. The average quality quite inferior to that of the crop of 1898. This is accounted for largely by the sun scald in June, and the dry weather which followed, thus preventing the plants from obtaining a sufficient amount of moisture to grow the fruit to its normal size, and properly mature the same and give it strength to resist the attack of the Aphis. The reports from Oregon, Washington and California show an aggregate yield of 170,000 bales, which is an excess over the crop of 1898 of 20,000 bales. The German crop was larger than that of 1897, which was considered the banner crop, while the English crop was nearly double that of 1898.

Prices have again ruled very low. While a few exceptionally fine growths have been able to command extreme prices, the great bulk of the crop has been marketed at prices ranging from seven cents to eleven cents per pound. Reports from the hop-growing districts indicate that there will be quite a large reduction in the acreage the coming season. Buyers and dealers are loud in their complaints as to the slovenly picking and careless manner of handling the hops at the kiln. They give positive assurances that if the hops were cleanly picked and skillfully handled during the curing process the export trade would be largely increased, thus creating a greater demand with tendency toward higher prices.

Exports for fiscal year ending September 1, 1899, 120,000 bales. Exports from September 1, 1899, to January 1, 1900, 20,000 bales.

CONCLUSIONS.

The attendance, as our treasurer's report of gate receipts shows, was, we are sorry to say, not what it should have been when we consider the excellence of the exhibits and the varied attractions presented every afternoon and evening.

President Woodruff was tendered a reception on Wednesday evening, by Mr. and Mrs. W. Judson Smith, at their residence in West Genesee street, which was attended by the members of the Executive Board of the New York State Agricultural Society and hundreds of the most prominent citizens of Syracuse.

Governor Roosevelt arrived in Syracuse Thursday evening.

All railroads ran excursion trains into the State Fair grounds on Friday, Governor's day. This day was counted upon to bring to the fair the best crowd of the week. But all prophecies of this kind are made conditional upon the weather, and the weather was on Friday morning as bad as it could be. It was of no value that it cleared after ten o'clock, for the people who come to the fair from the county get started early in the morning, and a rainy morning, indicating a rainy day, is sure to deter people from leaving their homes.

The Governor, accompanied by a number of distinguished gentlemen, left the Yates hotel about noon on Friday for the fair grounds, on President Woodruff's drag. The party was met on the boulevard by the Forty-first Separate Company and escorted to the headquarters building, where they were received by members of your committee. The grand parade of horses and cattle then took place, and the Governor was much pleased with the exhibition. At the close of the parade the Governor, after partaking of refreshments in the private lunch-room of the society, visited the exhibition buildings, going to the track later to speak. During his speech, which was an excellent one and received with hearty cheers by those present, the Governor said that he had been much impressed with the character of the exhibits, and he doubted if there was another State fair in the Union which was its equal. In the evening a dinner was given by President Woodruff to the Governor at the Yates. About seventy guests, including the members of the Executive Board, attended the banquet. Adresses were made by the Governor, President Woodruff, Judge Andrews, Senators Raines and White and others, conveying many valuable suggestions for the future management of the State fair.

The Fifty-ninth Annual State Fair, which closed on Saturday, September 9th, demonstrated that as fine an exhibition can be made in this State, of everything of interest and value to the farming community, as can be made in any State in the country, and the only problem to be solved in the future is how to make the fair, independent of its exhibits, so attractive that the public generally will attend.

We have no doubt that if the suggestions and ideas of our president and other friends of the society be adopted, that this interest will be established.

OBITUARY.

ROSWELL P. FLOWER.

Roswell P. Flower was born at Theresa, Jefferson county, N. Y., August 7, 1835, and died at Eastport, Long Island, May 12, 1899. His father died when Roswell was about eight years old. The family had a farm of thirty acres near the village of Theresa, and one of some 200 acres eight miles distant. The children worked on these farms until their sister, Caroline, married Silas S. George, a merchant of Theresa, and Roswell, who was fourteen years old at the time, was employed in his brother-in-law's store as a clerk, with the privilege of attending the village high school. After he graduated from the high school he found an opportunity to teach in a little school near the village. When he was in his eighteenth year he had an offer to go to Philadelphia as a clerk in a general merchandise store. His employer failed in business and Roswell returned to Theresa and worked on his mother's farm until an opening offered in Watertown in a hardware store. He shortly afterwards became deputy postmaster at that city, at a salary of $50 per month and his board. He now managed to save some money and at the end of his term of six years had accumulated about $1,000, with which he purchased an interest in a jewelry business, the firm being Hitchcock & Flower.

His aptitude for business enabled him to advance the interests of the firm, and in a couple of years he bought out his partner and continued alone in the business until 1869. During the time he was engaged in the jewelry business he devoted his spare time to reading and study. In 1869 Henry Keep, a wealthy man who had married a sister of Mr. Flower, died. When on his death bed he sent for Mr. Flower and placed the management of his large railroad and other interests in his hands for the benefit of his wife. The value of Keep's holdings, after his death, more than doubled under Mr. Flower's management. He opened an office in New York city, where he was joined by his brother, Anson R. Flower. The business increased so rapidly that another brother, John D., and a nephew, Frederick S. Flower, were taken into the firm. In 1890 Mr. Flower retired from active connection with the firm and became a special partner.

In politics Mr. Flower was always a Democrat, and always a consistant and active worker for his party. In 1881 he was elected to Congress from the Eleventh Congressional District. He took a prominent part in Congress, particularly on all financial questions. Mr. Flower was elected Governor of the State of New York in 1892. During the cholera epidemic in that year thousands of persons arriving from Europe were quarantined on ship board in New York bay. As an emergency measure, Mr. Flower bought with his own money the Fire Island hotel in the name of the State and ordered that the passengers be sent there.

Governor Flower, about two years ago, became interested in city railroads and other companies, and at the time of his death was a very large holder of such stocks. Governor Flower never refused his aid to any charitable institution that he could consistently befriend; he gave largely of his means every year to public and private charities.

He married in 1859 Miss Sarah M. Woodruff of Watertown. Three children were born to them, of whom only one is living. She was married in 1890 to John B. Taylor, of Watertown.

Mr. Flower loved his home and his friends, and was a citizen of the type that men respect and love. The agricultural community and the country at large suffered a great loss in the death of Governor Flower.

THOMAS L. HARISON.

Died October 20, 1899, in his sixty-eighth year. Born in New York city, March 21, 1832, the eldest son of Wm. H. Harison, of that city. He graduated at Columbia college in 1850, and immediately after made his residence at Morley, N. Y., and assumed charge of property belonging to his family, consisting of lands in northern New York, purchased by his grandfather, Richard Harison.

Mr. Harison became a life member of this society in 1861. In 1870 he was elected corresponding secretary, which position he occupied until 1887.

Treasurer's Report.

1899.

RECEIPTS.

Balance January 1, 1899	$3,051 08	
Notes discounted	22,036 51	
Life members	150 00	
Rent	120 00	
State appropriation for permanent improvements, etc	30,113 67	
Express refunded	90	
Receipts at State fair, including appropriation for premiums	45,635 37	
		$101,107 53

DISBURSEMENTS.

Salaries	$3,780 00	
Express	32 08	
Expenses of executive committee	888 47	
Postage	246 60	
Stationery	157 99	
Insurance	803 62	
Old accounts paid	184 76	
Interest	4,575 74	
Sundries	196 23	
Notes paid	37,306 36	
Permanent improvements	4,500 10	
Premiums at State fair	20,609 40	
Expenses at State fair	26,619 21	
		99,900 56
Balance on hand December 31, 1899		$1,206 97

AWARDS.

Fifty-ninth Annual Cattle Show and Fair of the New York State Agricultural Society Held at Syracuse, September 4-9, 1899.

CATTLE.

SHORTHORNS.

Shorthorn Bull, Three Years Old or Over.

W. A. Boland, by Aaron Barber, Avon; first prize, $30; Sharon Marshal 121136; sire Young Marshal; dam Lady Sharon.

Shorthorn Bull, One Year Old and Under Two.

W. A. Boland, by Aaron Barber, Avon; first prize, $20; Deputy Marshal 139707; sire Sharon Marshal; dam English Lady 13th.

Shorthorn Cow, Three Years Old or Over.

W. A. Boland, by Aaron Barber, Avon; first prize, $30; Julia's Pet; sire Young Marshal; dam Julia 25th.

Shorthorn Heifer, Two Years Old and Under Three.

W. A. Boland, by Aaron Barber, Avon; first prize, $25; Lady Sharon 4th; sire Young Marshal; dam Lady Sharon.

Shorthorn Heifer, One Year Old and Under Two.

W. A. Boland, by Aaron Barber, Avon; first prize, $20; Julia Marshal, sire Sharon Marshal; dam Julia's Pet.

Shorthorn Heifer Calf, Under One Year Old.

W. A. Boland, by Aaron Barber, Avon; first prize, $10; Lady Sharon 6th; sire Scottish Chief; dam Lady Sharon.

Shorthorns—Exhibitor's Herd.

W. A. Boland, by Aaron Barber, Avon; first prize, $50.

Shorthorns—Breeder's Young Herd.

W. A. Boland, by Aaron Barber, Avon; first prize, $30.

Shorthorns — Produce of One Cow.

W. A. Boland, by Aaron Barber, Avon; first prize, $20.

Shorthorns—Championship Bull, Any Age.

W. A. Boland, by Aaron Barber, Avon; first prize, $15.

Shorthorns — Championship Cow, Any Age.

W. A. Boland, by Aaron Barber, Avon; first prize, $15.

DEVONS.

Devon Bull, Three Years Old or Over.

James Hilton & Bro., New Scotland; first prize, $30; Patriot 6722; sire Lord Flemington; dam Provincial Maid.

A. S. Worden, Ulysses, Pa.; second prize, $20; Bill Nye W. 6216; sire Coburg Prince; dam Lady P.

Devon Bull, Two Years Old and Under Three.

A. S. Worden, Ulysses, Pa.; first prize, $25; Bob McKinley 6693; sire Bill Nye W.; dam Faith.

James Hilton & Bro., New Scotland; second prize, $15; Hyperion 6723; sire Lord Flemington; dam Nellie B.

Devon Bull, One Year Old and Under Two.

James Hilton & Bro., New Scotland; first prize, $20; Democracy 6897; sire Lord Flemington; dam Nellie B.

James Hilton & Bro., New Scotland; second prize, $10; Prosperity 6726; sire Lord Flemington; dam Provincial Queen.

Devon Bull Calf, Under One Year Old.

James Hilton & Bro., New Scotland; first prize, $10; Tulip's Royal 1st 6875; sire Tulip's Royal; dam Tulip of Woodland 17th.

B. F. Jones, South Montrose, Pa.; second prize, $5; Ruby Cup; sire Champion Cup; dam Jennie May.

Devon Cow, Three Years Old or Over.

B. F. Jones, South Montrose, Pa.; first prize, $30; Songstress 2d; sire Cupbearer; dam Songstress.

A. S. Worden, Ulysses, Pa.; second prize, $20; Miss T. 9605; sire Lord Lyndhurst; dam Matchless P.

Devon Heifer, Two Years Old and Under Three.

James Hilton & Bro., New Scotland; first prize, $25; Poppy 11638; sire Lord Flemington; dam Marchioness.

A. S. Worden, Ulysses, Pa.; second prize, $15; Fay 11587; sire Bill Nye W.; dam Little Josey 2d.

Devon Heifer, One Year Old and Under Two.

James Hilton & Bro., New Scotland; first prize, $20; Gloria 11640; sire Lord Flemington; dam Clarona.

B. F. Jones, South Montrose, Pa.; second prize, $10; Dawn of Springdale 2d 11791; sire Cupbearer; dam Dawn of Springdale.

Devon Heifer Calf, Under One Year Old.

James Hilton & Bro., New Scotland; first prize, $10; Tulip of Woodland.

A. S. Worden, Ulysses, Pa.; second prize, $5; Trixy.

Devons — Exhibitor's Herd.

James Hilton & Bro., New Scotland; first prize, $50.

A. S. Worden, Ulysses, Pa.; second prize, $25.

Devons — Breeder's Young Herd.

James Hilton & Bro., New Scotland; first prize, $30.

B. F. Jones, South Montrose, Pa.; second prize, $15.

Devons — Get of One Sire.

James Hilton & Bro., New Scotland; first prize, $30.

James Hilton & Bro., New Scotland; second prize, $15.

Devons — Produce of One Cow.

James Hilton & Bro., New Scotland; first prize, $20.

A. S. Worden, Ulysses, Pa.; second prize, $10.

Devons — Championship Bull, Any Age.

James Hilton & Bro., New Scotland; first prize, $15.

Devons —Championship Cow, Any Age.

B. F. Jones, South Montrose, Pa.; first prize, $15.

HEREFORDS.

Hereford Bull, Three Years Old or Over.

F. A. Nave, Attica, Ind.; first prize, $30; Dale 66481; sire Columbus; dam Rose Blossom.

Hereford Bull, Two Years Old and Under Three.

Clem Graves, Bunker Hill, Ind.; first prize, $25; Freedom 76005; sire Hero; dam Florence.

Hereford Bull, One Year Old and Under Two.

F. A. Nave, Attica, Ind.; first prize, $20; Elbert 88167; sire Ben Imboden; dam Kate.

Clem Graves, Bunker Hill, Ind.; second prize, $10; Columbus 10th 76780; sire Columbus; dam Cosmo.

Hereford Bull Calf, Under One Year.

George B. Conley, Marshall, Mich.; first prize, $10; Kansas King 87089; sire Sir Comewell; dam Countess King.

F. A. Nave, Attica, Ind.; second prize, $5; The Grove 1st; sire Dale; dam Livia Grove.

Hereford Cow, Three Years Old or Over.

F. A. Nave, Attica, Ind.; first prize, $30; Dolly 5th 71988; sire Java; dam Dolly.

Hereford Heifer, Two Years Old and Under Three.

Clem Graves, Bunker Hill, Ind.; first prize, $25; Viola 76785; sire Columbus; dam Vivien.

F. A. Nave, Attica, Ind.; second prize, $15; Wildeye 3d 78666; sire Valentine; dam Wildeye A.

Hereford Heifer, One Year Old and Under Two.

F. A. Nave, Attica, Ind.; first prize, $20; Carnation 77704; sire Acrobat; dam Erica 1st.

F. A. Nave, Attica, Ind.; second prize, $10; Queen of Fairview 4th 82819; sire Lamplighter, Jr.; dam Christy.

Hereford Heifer Calf, Under One Year Old.

F. A. Nave, Attica, Ind.; first prize, $10; Theresa; sire Dale; dam Dorcas.

Herefords — Exhibitor's Herd.

F. A. Nave, Attica, Ind.; first prize, $50.

Herefords — Breeder's Young Herd.

F. A. Nave, Attica, Ind.; first prize, $30.

Herefords — Get of One Sire.

F. A. Nave, Attica, Ind.; first prize, $30.
Clem Graves, Bunker Hill, Ind.; second prize, $15.

Herefords — Produce of One Cow.

Clem Graves, Bunker Hill, Ind.; first prize, $20.
Clem Graves, Bunker Hill, Ind.; second prize, $10.

Herefords — Championship Bull, Any Age.

F. A. Nave, Attica, Ind.; first prize, $15.

Herefords — Championship Cow, Any Age.

F. A. Nave, Attica, Ind.; first prize, $15.

SPECIAL PRIZE.

Offered by the American Hereford Cattle Breeders' Association.

Bull, Three Years Old or Over.

F. A. Nave, Attica, Ind.; first prize, $14.

Bull, Two Years Old and Under Three.

Clem Graves, Bunker Hill, Ind.; first prize, $14.

Bull, One Year Old and Under Two.

F. A. Nave, first prize, $12.
Clem Graves, second prize, $8.

Bull Calf, Under One Year Old.

Geo. B. Conley, Marshall, Mich.; first prize, $12.
F. A. Nave; second prize, $8.
F. A. Nave; third prize, $4.

Cow, Three Years Old or Over.

F. A. Nave; first prize, $14.

Heifer, Two Years Old and Under Three.

Clem Graves; first prize, $14.
F. A. Nave; second prize, $8.
F. A. Nave; third prize, $4.

Heifer, One Year Old and Under Two.

F. A. Nave; first prize, $12.
F. A. Nave; second prize, $8.
Clem Graves; third prize, $4.

Heifer Calf, Under One Year Old.

F. A. Nave; first prize, $12.
F. A. Nave; second prize, $8.

ABERDEEN-ANGUS.

Aberdeen-Angus Bull, Three Years Old or Over.

Thomas Mattinson, Jr., South Charleston, O.; first prize, $30; Black Victor 24135; sire Black Abbot; dam Victoria 3d.

James Blair, Hartstown, Pa.; second prize, $20; Waterside Baronet 25108.

Aberdeen-Angus Bull, Two Years Old and Under Three.

Thomas Mattinson, Jr., South Charleston, O.; first prize, $25; Springbrook Joe 27232; sire Royal Eric; dam Manrico's Queen.

James Blair, Hartstown, Pa.; second prize, $15; Rustler S. 29468.

Aberdeen-Angus Bull, One Year Old and Under Two.

Thos. Mattinson, South Charleston, O.; first prize, $20; Mattinson Lad 30835; sire Jaice 10th; dam Rosebud.

Thos. Mattinson, Jr., South Charleston, O.; second prize, $10; Lon 3d 30831; sire Jim Duff 2d; dam Lola's Pride.

Aberdeen-Angus Bull Calf, Under One Year.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $10; Mattinson 3d 33501; sire Black Victor; dam Nellie of Beaconsfield.

James Blair, Hartstown, Pa.; second prize, $5; Keynote; sire Rustler 2d; dam Bessie Compton.

Aberdeen-Angus Cow, Three Years Old or Over.

James Blair, Hartstown, Pa.; first prize, $30; Waterside Nellie 2d 23860.

James Blair, Hartstown, Pa.; second prize, $20; Waterside Belle 17537.

Aberdeen-Angus Heifer, Two Years Old and Under Three.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $25; Victoria of Beaconsfield 2d 25923; sire Royal Eric; dam Victoria 4th.

Thos. Mattinson, Jr., South Charleston, O.; second prize, $15; Mae Palmer 26538; sire Ensobia; dam Mae P.

Aberdeen-Angus Heifer, One Year Old and Under Two.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $20; Queen M. 29484; sire Black Victor; dam Manrico's Queen.

James Blair, Hartstown, Pa.; second prize, $10; Lady Baronet 32681.

Aberdeen-Angus Heifer Calf, Under One Year Old.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $10; Queen B. Lass 33502; sire Black Victor; dam Bella of Princeton.

James Blair, Hartstown, Pa.; second prize, $5; Nellie B. 2d.

Aberdeen-Angus — Exhibitor's Herd.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $50.

James Blair, Hartstown, Pa.; second prize, $25.

Aberdeen-Angus — Breeder's Young Herd.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $30.

James Blair, Hartstown, Pa.; second prize, $15.

Aberdeen-Angus — Get of One Sire.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $30.

James Blair, Hartstown, Pa.; second prize, $15.

Aberdeen-Angus — Produce of One Cow.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $20.

James Blair, Hartstown, Pa.; second prize, $10.

Aberdeen-Angus — Championship Bull, Any Age.

Thos. Mattinson, Jr., South Charleston, O.; first prize, $15.

Aberdeen-Angus — Championship Cow, Any Age.

James Blair, Hartstown, Pa.; first prize, $15.

RED POLLS.

Red Poll Bull, Three Years Old or Over.

L. Mitchell, Pulaski; first prize, $30; Iowa Davyson 3545; sire Davyson 18th; dam Davy 6th.

Red Poll Bull, Two Years Old and Under Three.

Frank Hartline, Strasburg, O.; first prize, $25; Floyd 5487; sire Columbus; dam Duchess of Iowa.

Red Poll Bull, One Year Old and Under Two.

L. Mitchell, Pulaski; first prize, $20; Toral; sire Booth; dam Lida.

Red Poll Bull Calf, Under One Year.

Frank Hartline, Strasburg, O.; first prize, $10; Samson; sire Holly; dam Tiger Lilly.

L. Mitchell, Pulaski; second prize, $5; Poughkeepsie; sire Dude; dam Toolish Davy.

Red Poll Cow, Three Years Old or Over.

L. Mitchell, Pulaski; first prize, $30; Flora 2d 8538; sire Hero; dam Flora.

Frank Hartline, Strasburg, O.; second prize, $20; Pretty Minnie 5857; sire Pando; dam Pretty Girl.

Red Poll Heifer, Two Years Old and Under Three.

Frank Hartline, Strasburg, O.; first prize, $25; Levona 11449; sire Cherokee; dam Effie.

Frank Hartline, Strasburg, O.; second prize, $15; Flora 12304; sire Davy's Pride; dam Terra Cotta.

Red Poll Heifer, One Year Old and Under Two.

L. Mitchell, Pulaski; first prize, $20; Batavia; sire Booth; dam Bessie.

Frank Hartline, Strasburg, O.; second prize, $10; Annie; sire Cherokee; dam Orpha.

Red Poll Heifer Calf, Under One Year Old.

Frank Hartline, Strasburg, O.; first prize, $10; Pansy; sire Cherokee; dam Orpha.

L. Mitchell, Pulaski; second prize, $5; sire Booth; dam Bessie.

Red Poll — Exhibitor's Herd.

L. Mitchell, Pulaski; first prize, $20.
Frank Hartline, Strasburg, O.; second prize, $10.

Red Poll — Breeder's Young Herd.

Frank Hartline, Strasburg, O.; first prize, $20.
L. Mitchell, Pulaski; second prize, $10.

Red Poll — Get of One Sire.

Frank Hartline, Strasburg, O.; first prize, $20.
L. Mitchell, Pulaski; second prize, $10.

Red Poll — Produce of One Cow.

L. Mitchell, Pulaski; first prize, $20.
Frank Hartline, Strasburg, O.; second prize, $10.

Red Poll — Championship Bull, Any Age.

L. Mitchell, Pulaski; first prize, $15.

Red Poll — Championship Cow, Any Age.

L. Mitchell, Pulaski; first prize, $15.

BROWN SWISS.

Brown Swiss Bull, Three years Old or Over.

F. W. Hull & Sons, Lane, O.; first prize, $30; Winfield Scott 2d 925; sire Winfield Scott; dam Selah.

McLaury Bros., Portlandville; second prize, $20; Royal Worcester 747; sire Medo; dam Idlewild.

Brown Swiss Bull, Two Years Old and Under Three.

McLaury Bros., Portlandville; first prize, $25; Prince of River Meadow 938; sire Eddy Bonepart; dam Eliza 2d.

F. W. Hull & Sons, Lane, O.; second prize, $15; Henry Scott 1036; sire Winfield Scott; dam Selah.

Brown Swiss Bull, One Year Old and Under Two.

McLaury Bros., Portlandville; first prize, $20; Tell of River Meadow 1058; sire Vic Tell 2d; dam Vesta C.

I. M. Nutting, Woodville; second prize, $10; Baron of Adams; sire Saywhen; dam Chimes Girl.

Brown Swiss Bull Calf, Under One Year.

McLaury Bros., Portlandville; first prize, $10; Royal of River Meadow 1200; sire Royal Worcester; dam Eliza 2d.

F. W. Hull & Sons, Lane, O.; second prize, $5; Bismark H.

Brown Swiss Cow, Three Years Old or Over.

McLaury Bros., Portlandville; first prize, $30; Miss Florine 406; sire Brin Tell; dam Florine.

F. W. Hull & Sons, Lane, O.; second prize, $20; Leona 1085; sire Bonafide; dam Selah.

Brown Swiss Heifer, Two Years Old and Under Three.

McLaury Bros., Portlandville; first prize, $25; Florine of River Meadow 1407; sire Noble of Berne; dam Florine 2d.

F. W. Hull & Sons, Lane, O.; second prize, $15; Bethlehem 1449; sire Boas; dam Lephgr 2d.

Brown Swiss Heifer, One Year Old and Under Two.

I. M. Nutting, Woodville; first prize, $20; Inize; sire Saywhen; dam Lucy.

McLaury Bros., Portlandville; second prize, $10; Greta of River Meadow 1585; sire Eddy Bonepart; dam Eliza 2d.

Brown Swiss Heifer Calf, Under One Year Old.

McLaury Bros., Portlandville; first prize, $10; Royal's Florine 1766; sire Royal Worcester; dam Florine of River Meadow.

F. W. Hull & Sons, Lane, O.; second prize, $5; Blanch H; sire Winfield Scott 2d; dam Alida.

Brown Swiss — Exhibitor's Herd.

McLaury Bros., Portlandville; first prize, $20.

F. W. Hull & Sons, Lane, O.; second prize, $10.

Brown Swiss — Breeder's Young Herd.

McLaury Bros., Portlandville; first prize, $20.

F. W. Hull & Sons, Lane, O.; second prize, $10.

Brown Swiss — Get of One Sire.

McLaury Bros., Portlandville; first prize, $20.

I. M. Nutting, Woodville; second prize, $10.

Brown Swiss — Produce of One Cow.

McLaury Bros., Portlandville; first prize, $20.

F. W. Hull & Sons, Lane, O.; second prize, $10.

Brown Swiss — Championship Bull, Any Age.

McLaury Bros., Portlandville; first prize, $15.

Brown Swiss — Championship Cow, Any Age.

McLaury Bros., Portlandville; first prize, $15.

HOLSTEIN-FRIESIANS.

Holstein-Friesian Bull, Three Years Old or Over.

W. A. Matteson, Utica; first prize, $30; Pietertje Hengerold's Paul DeKol 22128; sire DeKol 2d's Paul DeKol; dam Pietertje Hengerveld.

A. A. Cortelyou, Neshanic, N. J.; second prize, $20; Netherland Statesman's Executor 22117; sire Netherland Statesman; dam Executrix Netherland.

Holstein-Friesian Bull, Two Years Old and Under Three.

F. P. Knowles, Worcester, Mass.; first prize, $25; Count Paul DeKol 2d 23569; sire Count Paul DeKol; dam Heiler 3d Twisk.

Averill & Gregory, Syracuse, for Henry Stevens & Sons; second prize, $15; DeKol 2d's Butter Boy 3d; sire Manor DeKol.

Holstein-Friesian Bull, One Year Old and Under Two.

A. A. Cortelyou, Neshanic, N.J.; first prize, $20; Soldene Clothilde Artes 24002; sire Soldene 2d's Netherland; dam Derkje von Hollingen 3d.

W. M. Benninger, Benninger's, Pa.; second prize, $10; A. W. S. Jewel 24688; sire A 4th's W. Gorham; dam Sir J. Poladin.

Holstein-Friesian Bull Calf, Under One Year.

W. A. Matteson, Utica; first prize, $10; Homestead Crown Prince DeKol; sire Pietertje Hengerveld's Paul DeKol; dam Maplecroft Maid.

C. & W. C. Hunt, Liverpool; second prize, $5; Manor De Kol's Sir Clothilde; sire Manor DeKol; dam Clothilde Artis Belle.

Holstein-Friesian Cow, Three Years Old or Over.

W. A. Matteson, Utica; first prize, $30; Aggie Lily 3d Netherland 34799; sire Inka Princess' Pietertje Netherland; dam Aggie Lily 3d.

A. A. Cortelyou, Neshanic, N. J.; second prize, $20.

Holstein-Friesian Heifer, Two Years Old and Under Three.

C. & W. C. Hunt, Liverpool; first prize, $25; Pleasant Valley Kate 2d; sire Konningen Sir Roland; dam Pleasant Valley Kate.

W. A. Matteson, Utica; second prize, $15; Piebe Queen 4th 45006; sire Wartence Netherland Prince; dam Piebe Queen.

Holstein-Friesian Heifer, One Year Old and Under Two.

C. & W. C. Hunt, Liverpool; first prize, $20; Rena C. Konningen 46172.

W. A. Matteson, Utica; second prize, $10; Inka DeKol Hengerveld 46762; sire Manor DeKol; dam Inka DeKol.

Holstein-Friesian Heifer Calf, Under One Year Old.

W. A. Matteson, Utica; first prize, $10; Homestead Gem Pauline DeKol; sire Pietertje Hengerveld's Paul DeKol; dam Maplecroft Gem.

W. M. Benninger, Benninger's, Pa.; second prize, $5; J. S. H. Lady Philpail 88921; sire M. L. Sir Henry; dam J. L. Philpail.

Holstein-Friesian — Exhibitor's Herd.

W. A. Matteson, Utica; first prize, $50.

A. A. Cortelyou, Neshanic, N. J.; second prize, $25.

Holstein-Friesian — Breeder's Young Herd.

A. A. Cortelyou, Neshanic, N. J.; first prize, $30.

C. & W. C. Hunt, Liverpool; second prize, $15.

Holstein-Friesian — Get of One Sire.

Henry Stevens & Sons, and Averill & Gregory; first prize, $30.

A. A. Cortelyou, Neshanic, N. J.; second prize, $15.

Holstein-Friesian — Produce of One Cow.

A. A. Cortelyou, Neshanic, N. J.; first prize, $20.

W. A. Matteson, Utica; second prize, $10.

Holstein-Friesian — Championship Bull, Any Age.

W. A. Matteson, Utica; first prize, $15.

Holstein-Friesian — Championship Cow, Any Age.

W. A. Matteson, Utica; first prize, $15.

AYRSHIRES.

Ayrshire Bull, Three Years Old or Over.

G. H. Bell, Rome; first prize, $30; Duke of Barcheskie 5903; sire Duke of York; dam Cherry 3d of Hillhouse.

Wm. Lindsay & Son, Elizabeth, N. J.; second prize, $20; Major Verbank 5280.

Ayrshire Bull, Two Years Old and Under Three.

E. H. & C. S. Barney, Milford; first prize, $25; Cock-a-Bendie 2nd; sire Cock-a-Bendie; dam Buncie 2nd of Holehouse.

J. O. Magie & Sons, Elizabeth, N. J.; second prize, $15; Klondike King; sire Golden Boy, Jr.; dam Spot Beauty.

Ayrshire Bull, One Year Old and Under Two.

E. H. & C. S. Barney, Milford; first prize, $20; White Monarch; sire Burnside Lad; dam White Floss.

G. H. Bell, Rome; second prize, $10; Dewey B. 6065; sire Columbian King; dam Queen of Riverside Park.

Ayrshire Bull Calf, Under One Year.

E. H. & C. S. Barney, Milford; first prize, $10; White Prince; sire Burnside Lad; dam Lady Marion 2nd of Barcheskie.

J. O. Magie & Sons, Elizabeth, N. J.; second prize, $5; Prince Hebron; sire Loudown of Brookside; dam Princess Hebron.

Ayrshire Cow, Three Years Old or Over.

G. H. Bell, Rome; first prize, $30; Lady Marion of Barcheskie 13309; sire Dalquig of Treesmax; dam Bessie of Treesmax.

E. H. & C. S. Barney, Milford; second prize, $20; White Floss 13343; sire Duke of the Hill; dam Floss.

Ayrshire Heifer, Two Years Old and Under Three.

E. H. & C. S. Barney, Milford; first prize, $25; Beauty of Guelph 14567; sire Royal Chief 2nd; dam Beauty of Loudownhill.

J. F. Converse & Co., Woodville; second prize, $15; Grace Carlton 14714; sire Carlton Omega; dam Isolda.

Ayrshire Heifer, One Year Old and Under Two.

G. H. Bell, Rome; first prize, $20; Flossie of Riverside Park 14671; sire Duke of Barcheskie; dam Snowflake of Rome.

E. H. & C. S. Barney, Milford; second prize, $10; Buncie 3d of Holehouse; sire Burnside Lad; dam Buncie 2d of Holehouse.

Ayrshire Heifer Calf, Under One Year Old.

E. H. & C. S. Barney, Milford; first prize, $10; Maggie Mitchell; sire Burnside Lad; dam Maggie Mitchell 2d.

L. Huffstater, Sandy Creek; second prize, $5; May; sire Vinewood Peerless; dam Rosewood May.

Ayrshires — Exhibitor's Herd.

G. H. Bell, Rome; first prize, $50.

E. H. & C. S. Barney, Milford; second prize, $25.

Ayrshires — Breeder's Young Herd.

G. H. Bell, Rome; first prize, $30.

E. H. & C. S. Barney, Milford; second prize, $15.

Ayrshires — Get of One Sire.

E. H. & C. S. Barney, Milford; first prize, $30.

G. H. Bell, Rome; second prize, $15.

Ayrshires — Produce of One Cow.

J. F. Converse & Co., Woodville; first prize, $20.

E. H. & C. S. Barney, Milford; second prize, $10.

Ayrshires — Championship Bull, Any Age.

G. H. Bell, Rome; first prize, $15.

Ayrshires — Championship Cow, Any Age.

G. H. Bell, Rome; first prize, $15.

JERSEYS.

Jersey Bull, Three Years Old or Over.

McLaury Bros., Portlandville; first prize, $30; Burnside Comatrio 43253; sire Comely's Matilda Rioter; dam Atlantic Rop.

J. O. Magie & Sons, Elizabeth, N. J.; second prize, $20; Col. of St. Francis 48947; sire Rufa of St. Francis; dam Little Van of St. Francis.

Jersey Bull, Two Years Old and Under Three.

McLaury Bros., Portlandville; first prize, $25; Czar of River Meadow 51936; sire Jersey Beau; dam Rockwood Lucy.

A. H. Cooley, Little Britain; second prize, $15; Frolic's Pedro 52082; sire Pedro 6th; dam Frolic's Gem.

Jersey Bull, One Year Old and Under Two.

McLaury Bros., Portlandville; first prize, $20; Queen's Czar; sire Czar Coomassie; dam Queen Jefra.

McLaury Bros., Portlandville; second prize, $10; Climax of River Meadow 55333; sire Rockwood Beau; dam Jessie of Milford.

Jersey Bull Calf, Under One Year.

Geo. W. Sisson, Jr., Potsdam; first prize, $10; Lucky Kaffee 54856; sire Kaffee's Noble 3d 33108; dam Zelies Good Luck 109347.

McLaury Bros., Portlandville; second prize, $5; Fanny's Golden Lad; sire Rockwood Beau; dam Harry's Tamy.

Jersey Cow, Three Years Old or Over.

A. H. Cooley, Little Britain; first prize, $30; Agnes of St. Francis 106191; sire Rufa of St. Francis; dam Grace of St. Francis.

Geo. W. Sisson, Jr., Potsdam; second prize, $20; Pogis 72500; sire Vibert's Stoke Pogis 25549; dam Patience Pogis 61110.

Jersey Heifer, Two Years Old and Under Three.

A. H. Cooley, Little Britain; first prize, $25; Lady Cordialite; sire Miladi's Rufa; dam Cordialite 2d.

McLaury Bros., Portlandville; second prize, $15; Beauty of York 125658; sire Atricia's Rufa; dam Beauty of Dunleith.

Jersey Heifer, One Year Old and Under Two.

McLaury Bros., Portlandville; first prize, $20; Dame of River Meadow 135726; sire Rockwood Beau; dam Dame of Milford.

E. W. Mosher, Aurora; second prize, $10; Ledyard's Belle; sire Ledyard; dam Mora M.

Jersey Heifer Calf, One Year Old.

McLaury Bros., Portlandville; first prize, $10; Beau's Roxy 143365; sire Rockwood Beau; dam Roxy of Clinton.

McLaury Bros., Portlandville; second prize, $5; Amelia of River Meadow 143364; sire John Henry of Cold Spring; dam Star of River Meadows.

Jerseys — Exhibitor's Herd.

McLaury Bros., Portlandville; first prize, $50.

A. H. Cooley, Little Britain; second prize, $25.

Jerseys — Breeder's Young Herd.

McLaury Bros., Portlandville; first prize, $30.

A. H. Cooley, Little Britain; second prize, $15.

Jerseys — Get of One Sire.

McLaury Bros., Portlandville; first prize, $30.
E. W. Mosher, Aurora; second prize, $15.

Jerseys — Produce of One Cow.

E. W. Mosher, Aurora; first prize, $20.
J. O. Magie & Sons, Elizabeth, N. J.; second prize, $10.

Jerseys — Championship Bull, Any Age.

McLaury Bros., Portlandville; first prize, $15.

Jerseys — Championship Cow, Any Age.

A. H. Cooley, Little Britain; first prize, $15.

GUERNSEYS.

Guernsey Bull, Three Years Old or Over.

James Forsyth, Owego; first prize, $30.
I. M. Nutting, Woodville; second prize, $20; Glenn; sire Glenwood 2d; dam Beauty of Lakeside.

Guernsey Bull, One Year Old and Under Two.

James Forsyth, Owego; first prize, $20.

Guernsey Bull Calf, Under One Year.

James Forsyth, Owego; first prize, $10.

Guernsey Cow, Three Years Old or Over.

James Forsyth, Owego; first prize, $30.

Guernsey Heifer, Two Years Old and Under Three.

James Forsyth, Owego; first prize, $25.

Guernsey Heifer, One Year Old and Under Two.

James Forsyth, Owego; first prize, $20.

Guernsey Heifer Calf, Under One Year Old.

James Forsyth, Owego; first prize, $10.

Guernseys — Exhibitor's Herd.

James Forsyth, Owego; first prize, $50.

Guernseys — Breeder's Young Herd.

James Forsyth, Owego; first prize, $30.

Guernseys — Get of One Sire.

James Forsyth, Owego; first prize, $30.

Guernseys — Produce of One Cow.

James Forsyth, Owego; first prize, $20.

Guernseys — Championship Bull, Any Age.

James Forsyth, Owego; first prize, $15.

Guernseys — Championship Cow, Any Age.

James Forsyth, Owego; first prize, $15.

DUTCH BELTED.

Dutch Belted — Exhibitor's Herd.

Frank D. Edson, Portlandville; first prize, $20.

Dutch Belted — Breeder's Young Herd.

Frank D. Edson, Portlandville; first prize, $20.

Dutch Belted Bull, Two Years Old or Over.

Frank D. Edson, Portlandville; first prize, $15; Clinton 265; sire Buffalo Bill; dam Helen.

Dutch Belted Bull, Under Two Years.

Frank D. Edson, Portlandville; first prize, $15; Sandy 341; sire Clinton; dam Mabel Green.

Dutch Belted Cow, Two Years Old or Over.

Frank D. Edson, Portlandville; first prize, $15; Clara Sanford 565.

Dutch Belted Heifer, Under Two Years Old.

Frank D. Edson, Portlandville; first prize, $15; Honey Bunch 815; sire Clinton; dam Margaret.

FRENCH CANADIANS.

French Canadians — Exhibitor's Herd.

C. E. Colburn, Portlandville; first prize, $20.

French Canadians — Breeder's Young Herd.

C. E. Colburn, Portlandville; first prize, $20.

French Canadian Bull, Two Years Old or Over.

C. E. Colburn, Portlandville; first prize, $15; Denis Jewel 924; sire Prince Elegant; dam Marengo.

French Canadian Bull, Under Two Years.

C. E. Colburn, Portlandville; first prize, $15; Prince of Hillside 1139; sire Denis Jewel; dam Princess De Juta.

French Canadian Cow, Two Years Old or Over.

C. E. Colburn, Portlandville; first prize, $15; Marengo 1356; sire Ribeau; dam Dominion.

French Canadian Heifer, Under Two Years Old.

C. E. Colburn, Portlandville; first prize, $15; Princess of Hillside 5612; sire Denis Jewel; dam Champion 5th.

HORSES.

CLYDESDALES AND ENGLISHSHIRES.

Clydesdale Stallion, Three Years Old or Over.

Draper & Porter, Waterport; first prize, $25; Warlock 8053; sire Second Choice; dam Lady Superior.

Clydesdale Mare, Three Years Old or Over.

Smiths & Powell Co., Syracuse; first prize, $20; Princess Joy 7585; sire King Rufus; dam Princess.

Smiths & Powell Co., Syracuse; second prize, $10; Princess Pride 5230; sire Rufus; dam Princess.

Clydesdale Mare, One Year Old and Under Two.

J. H. Webster, Marathon; first prize, $10.

PERCHERONS.

Percheron Stallion, Three Years Old or Over.

P. B. Wilson, Kuckville, first prize, $25.

Averill & Gregory, Syracuse; second prize, $12; Milo; sire Viadel; dam Coca.

Percheron Mare, Three Years Old or Over.

Smiths & Powell Co., Syracuse; first prize, $20; Undine 2d 15652; sire Belidai; dam Undine.

FRENCH COACH.

French Coach Stallion and Four of His Get, Under Four Years.

Shelter Valley Farm, Marcellus; first prize, $25; Busnel; sire Orfila; dam Brebis.

French Coach Stallion, Three Years Old or Over.

Shelter Valley Farm, Marcellus; first prize, $25; Busnel; sire Orfila; dam Brebis.

Richard Hicks, Auburn; second prize, $12; Lincoln 1599; sire Government Stallion Etudiant; dam Diana.

French Coach Stallion, Two Years Old and Under Three.

A. C. Martin, Seneca Falls; first prize, $20; Corsican; sire Busnel; dam Gladiateur.

French Coach Mare, Three Years Old or Over.

Shelter Valley Farm, Marcellus; second prize, $10; Geneverie 1426; sire Perfection; dam Geneverie 2d.

French Coach Mare, One Year Old and Under Two.

Edward A. Powell, Syracuse; first prize, $10; Mademoiselle 2d; sire Rouen; dam Mademoiselle.

CLEVELAND BAYS.

Cleveland Bay, Best Stallion of Any Age.

R. M. Sharra, Oswego; first prize, $30.

Cleveland Bay, Best Mare of Any Age.

Geo. I. Brown, Elbridge; first prize, $30; Lady Louisa (Imp.) 127; sire Prince Robert; dam Freemason.

W. S. Brown, Elbridge; second prize, $15; Trixy; sire Lord Clioe 862; dam Joy 277.

HACKNEYS.

Hackney Mare, Four Years Old or Over, with Foal at Foot.

Averill & Gregory, Syracuse; second prize, $12; Leon Fireway; sire Fireway; dam Coutts.

Hackney Mare, Three Years Old or Over.

Averill & Gregory, Syracuse; first prize, $20; Diadem; sire Little Wonder; dam Regina.

Hackney Mare, One Year Old and Under Two.

Averill & Gregory, Syracuse; second prize, $5; Wilks Membrino King Maid; sire Warren R.; dam Alice C.

STANDARD BRED.

Standard Bred Stallion and Four of His Get, Under Four Years.

Village Farm, East Aurora; first prize, $25.

Standard Bred Stallion, Three Years Old or Over.

Village Farm, East Aurora; first prize, $25.
Edward A. Powell, Syracuse; second prize, $12; St. Christopher 29876; sire Lakeside Norval; dam Lakeside Emerald.

Standard Bred Stallion, Two Years Old and Under Three.

Geo. C. Jeffrey, Albion; first prize, $20; Fortune Finder 30281; sire Olney Wilks; dam Susette.
Village Farm, East Aurora; second prize, $10.

Standard Bred Stallion, One Year Old and Under Two.

Village Farm, East Aurora; first prize, $10.

Standard Bred Mare, Four Years Old or Over, with Foal at Foot.

Village Farm, East Aurora; first prize, $25.
Geo. C. Jeffrey, Albion; second prize, $12; Susette; sire Mambrino King; dam Maud.

Standard Bred Mare, Four Years Old or Over, Not in Foal.

Village Farm, East Aurora; first prize, $20.
Edward A. Powell, Syracuse; second prize, $10; Lady Davis; sire King Alcazar; dam Davis Maid.

Standard Bred Mare, Three Years Old and Under Four.

Village Farm, East Aurora; first prize, $20.
A. R. Gillis, Syracuse; second prize, $10; Prude; sire El Hadji; dam Redoline.

Standard Bred Mare, Two Years Old and Under Three.

Village Farm, East Aurora; first prize, $20.
A. R. Gillis, Syracuse; second prize, $10; Prim; sire El Hadji; dam Redoline.

Standard Bred Mare, One Year Old and Under Two.

Village Farm, East Aurora; first prize, $10.

Standard Bred, Best Foal.

Village Farm, East Aurora; first prize, $10.
Geo. C. Jeffrey, Albion; second prize, $5; Musette; sire Orleans Boy; dam Susette.

CARRIAGE AND COACH.

Carriage and Coach Mare, Four Years Old or Over, with Foal at Foot.

Shelter Valley Farm, Marcellus; first prize, $25.
S. B. Babcock, Fulton; second prize, $12; Pet and Victoria.

Carriage and Coach Mare, Three Years Old or Over.

E. A. Powell, Syracuse; first prize, $20; May Day; sire Prince of Normandy; dam Daisette.
Shelter Valley Farm, Mercellus; second prize, $10.

Carriage and Coach Mare, Two Years Old and Under Three.

Shelter Valley Farm, Marcellus; first prize, $20.
A. R. Gillis, Syracuse; second prize, $10; Prim; sire El Hadji; dam Redoline.

Carriage and Coach Mare, One Year Old and Under Two.

E. A. Powell, Syracuse; first prize, $10.

Carriage and Coach, Best Foal.

S. B. Babcock, Fulton; first prize, $10.
Shelter Valley Farm; Marcellus; second prize, $5.

Carriage and Coach, Pair Cobs.

E. A. Powell, Syracuse; first prize, $40.

Carriage and Coach, Single Cob.

E. A. Powell, Syracuse; first prize, $20.

Best Saddle Horse.

E. A. Powell, Syracuse; first prize, $20.

Heavy Draft, Pair.

Smiths & Powell Co,, Syracuse; first prize, $20.

Heavy Draft, Single.

Smiths & Powell Co., Syracuse; first prize, $15.

Heavy Draft, Best Exhibit.

Smiths & Powell Co., Syracuse; first prize, $40.

Light Draft, Pair.

Smiths & Powell Co., Syracuse; first prize, $20.

Light Draft, Single.

Smiths & Powell Co., Syracuse; first prize, $15.

Light Draft, Best Exhibit.

Smiths & Powell Co., Syracuse; first prize, $40.

SPECIAL HORSE SHOW.

HARNESS.

Over 14 Hands, 1 Inch, and Not Exceeding 15 Hands.

H. C. Hoskier; first prize, $50; Lord Brilliant.
E. A. Powell; second prize, $25; Tommy Atkins.

Pair Over 14 Hands, 1 Inch, and Not Exceeding 15 Hands.

H. C. Hoskier; first prize, $75; Lord Brilliant and St. Wilkes.

Over 15 Hands and Not Exceeding 15 Hands, 3 Inches.

A. J. Nutting; first prize, $50; Holly.
Geo. G. Daniels; second prize, $25; Brandy.
A. J. Feek; third prize, $15; George Dresser.

Pair Over 15 Hands and Not Exceeding 15 Hands, 3 Inches.

A. J. Nutting; first prize, $75; Holly and Duke.
E. A. Powell; second prize, $35; Quicksilver and Sterling Silver.
Geo. G. Daniels; third prize, $20; Brandy and Soda.

Over 15 Hands, 3 Inches.

Ernestus Gulick; first prize, $50; Alco.
Geo. G. Daniels; second prize, $25; Gordon.
Geo. G. Daniels; third prize, $15; Glisten.

Pair Over 15 Hands, 3 Inches.

Geo. G. Daniels; first prize, $75; Glitter and Glisten.
A. J. Feek; second prize, $35; Tempest and Tower.
E. A. Powell; third prize, $20; David Harum and Mr. Dooley.

Horse and Runabout.

H. C. Hoskier; first prize, $50; Lieut. Wright.
A. J. Nutting; second prize, $25; Duke.
Folly Farm; third prize, $15; Lady Primrose.

Pair and Woman's Appropriate Vehicle.

H. C. Hoskier; first prize, $75; Lieut. Wilkes and Lieut. Wright.
A. J. Nutting; second prize, $35; Holly and Duke.
E. A. Powell; third prize, $20; Quicksilver and Sterling Silver.

Combination Harness and Saddle.

E. Alexander Powell; first prize, $75; Brilliant.
Folly Farm; second prize, $35; Quo Vadis.

Tandems — Leader Not to Exceed Wheeler in Height.

H. C. Hoskier; first prize, $75; Lord Brilliant and Lieut. Wilkes.

Tandems — Wheeler 15 Hands, 1 Inch and Over.

A. J. Nutting; first prize, $75; Holly and Duke.

Four-in-Hands.

Timothy L. Woodruff; first prize, $100.

SADDLE.

Over 14 Hands, 1 Inch, and Under 15 Hands, 2 Inches.

Folly Farm; first prize, $50.
E. F. Hawley; second prize, $25.

15 Hands, 2 Inches or Over.

Folly Farm; first prize, $50; Quo Vadis.

Maiden Harness, 15 Hands or Over.

Ernestus Gulick; first prize, $50; Alco.
Geo. G. Daniels; second prize, $25; Gordon.
Geo. G. Daniels; third prize, $15; Glisten.

Pair 15 Hands or Over.

Geo. G. Daniels; first prize, $75; Glitter and Glisten.
Geo. G. Daniels; second prize, $35; Brandy and Soda.

Over 14 Hands, 3 Inches, and Not Exceeding 16 Hands.

A. J. Nutting; first prize, $50; Holly.
Folly Farm; second prize, $25; Lady Primrose.

Long Tailed, 14 Hands, 2 Inches or Over.

E. Lake; first prize, $35.

Carriage and Coach Single.

Fourteen and One-quarter to Fifteen Hands, Appointments Considered.

Folly Farm; first prize, $30.
A. C. Martin; second prize, $15.

Harness, Pair, Three Years Old and Over, Appointments Considered.

S. Pendergast; first prize, $40.
A. R. Dawley; second prize, 20; Harry and Leo.

Harness, Single, Three Years Old and Over, Appointments Considered.

S. Pendergast; first prize, $30; May; sire Dictator; dam Allie.
S Pendergast; second prize, $15; Kitty; sire Kentucky Dictator; dam Kit.

Carriage and Coach, Pair.

Fifteen and Three-quarters Hands and Up, Appointments Considered.

E. A. Powell; first prize, $40.
S. C. Daley; second prize, $20.

Single, 15 3-4 Hands and Up, Appointments Considered.

Shelter Valley Farm; first prize, $30.
E. A. Powell; second prize, $15.

Pair, 15 3-4 Hands and Up.

E. A. Powell; first prize, $30.
A. C. Martin; second prize, $15.

Single, 15 3-4 Hands and Up.

E. A. Powell; first prize, $20.
A. C. Martin; second prize, $10.

Pair Cobs, 15 and Under 15 3-4 Hands.

E. A. Powell; first prize, $30.
A. C. Martin; second prize, $15.

Single Cob, 15 and Under 15 3-4 Hands.

Shelter Valley Farm; first prize, $20.
Folly Farm; second prize, $10.

SHETLAND PONIES.

Shetland Stallion and Four of His Get.

E. F. Hawley, Pittsford; Bismark of Pittsford; first prize, $20.

Shetland Stallion, Three Years Old or Over.

E. F. Hawley, Pittsford; Bismark of Pittsford; first prize, $20.
J. F. Converse & Co., Woodville; second prize, $10.

Shetland Stallion, Two Years Old.

E. F. Hawley, Pittsford; first prize, $20; Major Mc of Pittsford 3154.
J. H. Webster, Marathon; second prize, $10.

Shetland Stallion, Under Two Years Old.

J. F. Converse & Co., Woodville; first prize, $10.
L. D. Atwater, Waverly; second prize, $5.

Shetland Brood Mare, with Foal at Foot.

J. F. Converse & Co., Woodville; first prize, $20.
E. F. Hawley, Pittsford; second prize, $10; Lottie of Pittsford 1327.

Shetland Mare, Three Years Old or Over.

E. F. Hawley, Pittsford; first prize, $20; Lottie of Pittsford 1327.
E. F. Hawley, Pittsford; second prize, $10; June of Pittsford 1326.

Shetland Mare, Two Years Old.

E. F. Hawley, Pittsford; first prize, $20; Ella of Pittsford 3153.
Edward Roy, Southport; second prize, $10; Topsy; sire Gen. Sheridan; dam Susie.

Shetland Filly, Under Two Years Old.

E. F. Hawley, Pittsford; first prize, $10; Hebe of Pittsford 3162.
L. D. Atwater, Waverly; second prize, $5.

SHEEP.

COTSWOLDS.

Cotswold Ram, Two Years Old or Over.

P. Clark & Son, Cable, O.; first prize, $15
John Chick, Attica; second prize, $8.

Cotswold Ram, One Year Old and Under Two.

John Chick, Attica; first prize, $15.
John Chick, Attica; second prize, $8.

Cotswold Ram, Under One Year Old.

John Chick, Attica; first prize, $10.
John Chick, Attica; second prize, $5.

Cotswold Ewe, Two Years Old or Over.

P. Clark & Son, Cable, O.; first prize, $15
John Chick, Attica; second prize, $8.

Cotswold Ewe, One Year Old and Under Two.

P. Clark & Son, Cable, O.; first prize, $15
P. Clark & Son, Cable, O.; second prize, $8.

Cotswold Ewe, Under One Year Old.

John Chick, Attica; first prize, $10.
John Chick, Attica; second prize, $5.

Cotswold Flock.

P. Clark & Son, Cable, O.; first prize, $20.
John Chick, Attica; second prize, $10.

Cotswolds — Get of Ram.

John Chick, Attica; first prize, $15.

Cotswolds — Championship Ram, Any Age.

P. Clark & Son, Cable, O.; first prize, $15

Cotswolds — Championship Ewe, Any Age.

P. Clark & Son, Cable, O.; first prize, $15

SPECIAL PRIZE.

Offered by the American Cotswold Record Association for best flock, $10; and best pen of four lambs, $10.

Best Flock.

P. Clark & Son, Cable, O.; first prize, $10; best flock

Best Pen of Lambs.

John Chick, Attica; first prize, $10.

SOUTHDOWNS.

Southdown Ram, Two Years Old or Over.

Geo. Allen, Allerton, Ill.; first prize, $15.
A. Bordwell, Fargo; second prize, $8.

Southdown Ram, One Year Old and Under Two.

Geo. Allen, Allerton, Ill.; first prize, $15.
A. Bordwell, Fargo; second prize, $8.

Southdown Ram, Under One Year Old.

Geo. T. Stearns, Marion; first prize, $10.
A. Bordwell, Fargo; second prize, $5.

Southdown Ewe, Two Years Old or Over.

A. Bordwell, Fargo; first prize, $15.
Geo. Allen, Allerton, Ill.; second prize, $8.

Southdown Ewe, One Year Old and Under Two.

E. Campbell & Son, Pittsfield, O.; first prize, $15.
A. Bordwell, Fargo; second prize, $8.

Southdown Ewe, Under One Year Old.

T. C. Douglas, Galt, Ont.; first prize, $10.
Geo. T. Stearns, Marion; second prize, $5.

Southdown Flock.

A. Bordwell, Fargo; first prize, $20.
Geo. T. Stearns, Marion; second prize, $10.

Southdowns — Get of Ram.

Geo. T. Stearns, Marion; first prize, $15.
T. C. Douglas, Galt, Ont.; second prize, $8.

Southdowns — Championship Ram, Any Age.

Geo. Allen, Allerton, Ill.; first prize, $10.

Southdowns — Championship Ewe, Any Age.

A. Bordwell, Fargo; first prize, $15.

SHROPSHIRES.

Shropshire Ram, Two Years Old or Over.

Geo. Allen, Allerton, Ill.; first prize, $15.
Geo. Allen, Allerton, Ill.; second prize, $8.

Shropshire Ram, One Year Old and Under Two.

Geo. Allen, Allerton, Ill.; first prize, $15.
L. D. Rumsey, Lewiston; second prize, $8.

Shropshire Ram, Under One Year Old.

Geo. Allen, Allerton, Ill.; first prize, $10.
Geo. Allen, Allerton, Ill.; second prize, $5.

Shropshire Ewe, Two Years Old or Over.

Geo. Allen, Allerton, Ill.; first prize, $15.
Geo. Allen, Allerton, Ill.; second prize, $8.

Shropshire Ewe, One Year Old and Under Two.

Geo. Allen, Allerton, Ill.; first prize, $15.
G. Howard Davison, Millbrook; second prize, $8.

Shropshire Ewe, Under One Year Old.

Geo. Allen, Allerton, Ill.; first prize, $10.
G. Howard Davison, Millbrook; second prize, $5.

Shropshire Flock.

Geo. Allen, Allerton; first prize, $20.
Geo. Allen, Allerton; second prize, $10.

Shropshires — Get of Ram.

Geo. Allen, Allerton, Ill.; first prize, $15.
Folly Farm, Abington, Pa.; second prize, $8.

Shropshires — Championship Ram, Any Age.

Geo. Allen, Allerton, Ill.; first prize, $15.

Shropshires — Championship Ewe, Any Age.

Geo. Allen, Allerton, Ill.; first prize, $15.

SPECIAL PRIZE.

The American Shropshire Registry Association offered a special prize of $35, for registered Shropshires; $20 for best flock one year old or over and $15, for best flock of lambs.

Geo. Allen, Allerton, Ill.; first prize, $20.
Geo. Allen, Allerton, Ill.; first prize, $15.

HAMPSHIRES.

Hampshire Ram, Two Years Old or Over.

M. H. Thornton, Marshall, Mich.; first prize, $15.
A. F. White, Hornellsville; second prize, $8.

Hampshire Ram, One Year Old and Under Two.

M. H. Thornton, Marshall, Mich.; first prize, $15.
Mrs. N. B. Tucker, Alfred; second prize, $8.

Hampshire Ram, Under One Year Old.

M. H. Thornton, Marshall, Mich.; first prize, $10
M. H. Thorton, Marshall, Mich.; second prize, $5.

Hampshire Ewe, Two Years Old or Over.

M. H. Thornton, Marshall, Mich.; first prize, $15.
Mrs. N. B. Tucker, Alfred; second prize, $8.

Hampshire Ewe, One Year Old and Under Two.

M. H. Thornton, Marshall, Mich.; first prize, $15.
Mrs. N. B. Tucker, Alfred; second prize, $8.

Hampshire Ewe, Under One Year Old.

M. H. Thornton, Marshall, Mich.; first prize, $10
A. F. White, Hornellsville; second prize, $5.

Hampshire Flock.

M. H. Thornton, Marshall, Mich.; first prize, $20.
A. F. White, Hornellsville; second prize, $10.

Hampshires — Get of Ram.

M. H. Thornton, Marshall, Mich.; first prize, $15.
A. F. White, Hornellsville; second prize, $8.

Hampshires — Championship Ram, Any Age.

M. H. Thornton, Marshall, Mich.; first prize, $15.

Hampshires — Championship Ewe, Any Age.

M. H. Thornton, Marshall, Mich.; first prize, $15.

SPECIAL PRIZE.

The Hampshire-Down Breeders' Association offered a special prize for the four best registered Hampshire-Down lambs—two rams and two ewes—owned and bred in the State of New York.

E. M. Benham, Hopewell Centre; first prize, $25.
A. F. White, Hornellsville; second prize, $15.

OXFORD-DOWNS.

Oxford-Down Ram, Two Years Old or Over.

A. Bordwell, Fargo; first prize, $15.
A. Bordwell, Fargo; second prize, $8.

Oxford-Down Ram, One Year Old and Under Two.

A. Bordwell, Fargo; first prize, $15.
C. B. Bowen, Attica; second prize, $8.

Oxford-Down Ram, Under One Year Old.

A. Bordwell, Fargo; first prize, $10.
A. Bordwell, Fargo; second prize, $5.

Oxford-Down Ewe, Two Years Old or Over.

A. Bordwell, Fargo; first prize, $15.
A. Bordwell, Fargo; second prize, $8.

Oxford-Down Ewe, One Year Old and Under Two.

A. Bordwell, Fargo; first prize, $15.
C. B. Bowen, Attica; second prize, $8.

Oxford-Down Ewe, Under One Year Old.

A. Bordwell, Fargo; first prize, $10.
C. B. Bowen, Attica; second prize, $5.

Oxford-Down Flock.

A. Bordwell, Fargo; first prize, $20.
C. B. Bowen, Attica; second prize, $10.

Oxford-Downs — Get of Ram.

A. Bordwell, Fargo; first prize, $15.
C. B. Bowen, Attica; second prize, $8.

Oxford-Downs — Championship Ram, Any Age.

A. Bordwell, Fargo; first prize, $15.

Oxford-Downs — Championship Ewe, Any Age.

A. Bordwell, Fargo; first prize, $15.

SPECIAL PRIZE.

The American Oxford-Down Record Association offered a special prize of $75—$25 for best yearling ram, $25 for best yearling ewe, $25 for best pen of four lambs, either sex—all to be bred and owned by exhibitor in the State of New York.

Best Yearling Ram.

A. Bordwell, Fargo; first prize, $15.
C. B. Bowen, Attica; second prize, $10.

Best Yearling Ewe.

A. Bordwell, Fargo; first prize, $15.
C. B. Bowen, Attica; second prize, $10.

Best Pen of Four Lambs.

A. Bordwell, Fargo; first prize, $15.
C. B. Bowen, Attica; second prize, $10.

CHEVIOTS.

Cheviot Ram, Two Years Old or Over.

William Curry, Hartwick; first prize, $15.
William Curry, Hartwick; second prize, $8.

Cheviot Ram, One Year Old and Under Two.

William Curry, Hartwick; first prize, $15.
William Curry, Hartwick; second prize, $8.

Cheviot Ram, Under One Year Old.

William Curry, Hartwick; first prize, $10.
George Lough, Hartwick; second prize, $5.

Cheviot Ewe, Two Years Old or Over.

William Curry, Hartwick; first prize, $15.
William Curry, Hartwick; second prize, $8.

Cheviot Ewe, One Year Old and Under Two.

A. F. White, Hornellsville; first prize, $15.
George Lough, Hartwick; second prize, $8.

Cheviot Ewe, Under One Year Old.

William Curry, Hartwick; first prize, $10.
William Curry, Hartwick; second prize, $5.

Cheviot Flock.

William Curry, Hartwick; first prize, $20.
William Curry, Hartwick; second prize, $10.

Cheviots — Get of Ram.

William Curry, Hartwick; first prize, $15.
George Lough, Hartwick; second prize, $8.

Cheviots — Championship Ram, Any Age.

William Curry, Hartwick; first prize, $15.

Cheviots — Championship Ewe, Any Age.

William Curry, Hartwick; first prize, $15.

DORSET-HORNS.

Dorset-Horn Ram, Two Years Old or Over.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

Dorset-Horn Ram, One Year Old and Under Two.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

Dorset-Horn Ram, Under One Year Old.

R. Stuyvesant, Allamuchy, N. J.; first prize, $10.

Dorset-Horn Ewe, Two Years Old or Over.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

Dorset-Horn Ewe, One Year Old and Under Two.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

Dorset-Horn Ewe, Under One Year Old.

R. Stuyvesant, Allamuchy, N. J.; first prize, $10.

Dorset-Horn Flock.

R. Stuyvesant, Allamuchy, N. J.; first prize, $20.

Dorset-Horns — Get of Ram.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

Dorset-Horns — Championship Ram, Any Age.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

Dorset-Horns — Championship Ewe, Any Age.

R. Stuyvesant, Allamuchy, N. J.; first prize, $15.

MERINOS.

Merino Ram, Two Years Old or Over.

Peter Martin, Rush; first prize, $15.
David K. Bell, West Brighton; second prize, $8.

Merino Ram, One Year Old and Under Two.

David K. Bell, West Brighton; first prize, $15.
Peter Martin, Rush; second prize, $8.

Merino Ram, Under One Year Old.

Davis Cossitt, Onondaga; first prize, $10.
G. L. Wheeler, Yatesville; second prize, $5.

Merino Ram, Two Years Old or Over.

G. L. Wheeler, Yatesville; first prize, $15.
G. L. Wheeler, Yatesville; second prize, $8.

Merino Ewe, One Year Old and Under Two.

David K. Bell, West Brighton; first prize, $15.
Davis Cossitt, Onondaga; second prize, $8.

Merino Ewe, Under One Year Old.

G. L. Wheeler, Yatesville; first prize, $10.
Davis Cossitt, Onondaga; second prize, $15.

Merino Flock.

G. L. Wheeler, Yatesville; first prize, $20.
Davis Cossitt, Onondaga; second prize, $10.

Merinos — Get of Ram.

Davis Cossitt, Onondaga; first prize, $15.
G. L. Wheeler, Yatesville; second prize, $8.

Merinos — Championship Ram, Any Age.

Peter Martin, Rush; first prize, $15.

Merinos — Championship Ewe, Any Age.

David K. Bell, West Brighton; first prize, $15.

DELAINE-MERINOS.

Delaine-Merino Ram, Two Years Old or Over.

Davis Cossitt, Onondaga; first prize, $15.
E. Campbell & Son, Pittsfield, O.; second prize, $8.

Delaine-Merino Ram, One Year Old and Under Two.

G. L. Wheeler, Yatesville; first prize, $15.
David K. Bell, West Brighton; second prize, $8.

Delaine-Merino Ram, Under One Year Old.

E. Campbell & Son, Pittsfield, O.; first prize, $10.
G. L. Wheeler, Yatesville; second prize, $5.

Delaine-Merino Ewe, Two Years Old or Over.

G. L. Wheeler, Yatesville; first prize, $15.
E. Campbell & Son, Pittsfield, O.; second prize, $8.

Delaine-Merino Ewe, One Year Old and Under Two.

E. Campbell & Son, Pittsfield, O.; first prize, $15.
E. Campbell & Son, Pittsfield, O.; second prize, $8.

Delaine-Merino Ewe, Under One Year Old.

E. Campbell & Son, Pittsfield, O.; first prize, $10.
G. L. Wheeler, Yatesville; second prize, $5.

Delaine-Merino Flock.

E. Campbell & Son, Pittsfield, O.; first prize, $20.
G. L. Wheeler, Yatesville; second prize, $10.

Delaine-Merinos — Get of Ram.

Davis Cossitt, Onondaga; first prize, $15.
G. L. Wheeler, Yatesville; second prize, $8.

Delaine-Merinos — Championship Ram, Any Age.

Davis Cossitt, Onondaga; first prize, $15.

Delaine-Merinos — Championship Ewe, Any Age.

G. L. Wheeler, Yatesville; first prize, $15.

LEICESTERS.

Leicester Ram, Two Years Old or Over.

A. F. White, Hornellsville; first prize, $10.
Wm. Empie, Minaville; second prize, $5.

Leicester Ram, One Year Old and Under Two.

A. F. White, Hornellsville; first prize, $10.
Wm. Empie, Minaville; second prize, $5.

Leicester Ram, Under One Year Old.

A. F. White, Hornellsville; first prize, $8.
Wm. Empie, Minaville; second prize, $4.

Leicester Ewe, Two Years Old or Over.

A. F. White, Hornellsville; first prize, $10.
G. H. Bell, Rome; second prize, $5.

Leicester Ewe, One Year old and Under Two.

A. F. White, Hornellsville; first prize, $10.
A. F. White, Hornellsville; second prize, $5.

Leicester Ewe, Under One Year Old.

A. F. White, Hornellsville; first prize, $8.
A. F. White, Hornellsville; second prize, $4.

Leicester Flock.

A. F. White, Hornellsville; first prize, $15.
Wm. Empie, Minaville; second prize, $8.

Leicesters — Get of Ram.

A. F. White, Hornellsville; first prize, $10.

Leicesters — Championship Ram, Any Age.

A. F. White, Hornellsville; first prize, $10.

Leicesters — Championship Ewe, Any Age.

A. F. White, Hornellsville; first prize, $10.

LINCOLNS.

Lincoln Ram, Two Years Old or Over.

G. H. Bell, Rome; first prize, $10.

Lincoln Ram, Under One Year Old.

G. H. Bell, Rome; first prize, $8.

Lincoln Ewe, Two Years Old or Over.

G. H. Bell, Rome; first prize, $10.

Lincoln Ewe, One Year Old and Under Two.

G. H. Bell, Rome; first prize, $10.

Lincoln Ewe, Under One Year Old.

G. H. Bell, Rome; first prize, $8.

Lincoln Flock.

G. H. Bell, Rome; first prize, $15.

Lincolns — Championship Ram, Any Age.

G. H. Bell, Rome; first prize, $10.

Lincolns — Championship Ewe, Any Age.

G. H. Bell, Rome; first prize, $10.

SWINE.

CHESTER-WHITE.

Chester-White Boar, Two Years Old or Over.

W. A. Alexander, Scipioville; first prize, $12.
George Ellis, Arkport; second prize, $8.

Chester-White Boar, One Year Old and Under Two.

Amos Mosher & Son, Mapleton; first prize, $12.
George Ellis, Arkport; second prize, $8.

Chester-White Boar, Six Months and Under One Year.

W. A. Alexander, Scipioville; first prize, $10.
Amos Mosher & Son, Mapleton; second prize, $5.

Chester-White Boar, Under Six Months.

Harvey & Dempsey, Bloomingdale, Ind.; first prize, $10.
Amos Mosher & Son, Mapleton; second prize, $5.

Chester-White Sow, Two Years Old or Over.

W. A. Alexander, Scipioville; first prize, $12.
Amos Mosher & Son, Mapleton; second prize, $8.

Chester-White Sow, One Year Old and Under Two.

W. A. Alexander, Scipioville; first prize, $12.
W. A. Alexander, Scipioville; second prize, $8.

Chester-White Sow, Six Months and Under One Year.

Amos Mosher & Son, Mapleton; first prize, $10.
W. A. Alexander, Scipioville; second prize, $5.

Chester-White Sow, Under Six Months.

Harvey & Dempsey, Bloomingdale, Ind.; first prize, $10.
Harvey & Dempsey, Bloomingdale, Ind.; second prize, $5.

Chester-White Boar and Three Sows, Over One Year.

W. A. Alexander, Scipioville; first prize, $12.
Amos Mosher & Son, Mapleton; second prize, $8.

Chester-White Boar and Three Sows, Under One Year.

Harvey & Dempsey, Bloomingdale, Ind.; first prize, $12.
Amos Mosher & Son, Mapleton; second prize, $8.

Chester-Whites — Four Swine, Get of the Same Boar.

W. A. Alexander, Scipioville; first prize, $12.
Amos Mosher & Son, Mapleton; second prize, $8.

Chester-Whites — Four Pigs, Under Six Months, Produce of Same Sow.

Harvey & Dempsey, Bloomingdale, Ind.; first prize, $12.
Amos Mosher & Son, Mapleton; second prize, $8.

Chester-Whites—Championship Boar, Any Age.

W. A. Alexander, Scipioville; first prize, $10.

Chester-Whites — Championship Sow, Any Age.

W. A. Alexander, Scipioville; first prize, $10.

CHESHIRE.

Cheshire Boar, Two Years Old or Over.

R. D. Button & Son, Cottons; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Cheshire Boar, One Year Old and Under Two.

L. F. Doolittle, Ouaquaga; first prize, $12.
E. G. Van Lieu, Fleming; second prize, $8.

Cheshire Boar, Six Months and Under One Year.

L. F. Doolittle, Ouaquaga; first prize, $10.
R. D. Button & Son, Cottons; second prize, $5.

Cheshire Boar, Under Six Months.

R. D. Button & Son, Cottons; first prize, $10.
L. F. Doolittle, Ouaquaga; second prize, $5.

Cheshire Sow, Two Years Old or Over.

L. F. Doolittle, Ouaquaga; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Cheshire Sow, One Year and Under Two.

R. D. Button & Son, Cottons; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Cheshire Sow, Six Months and Under One Year.

E. G. Van Lieu, Fleming; first prize, $10.
R. D. Button & Son, Cottons; second prize, $5.

Cheshire Sow, Under Six Months.

R. D. Button & Son, Cottons; first prize, $10.
L. F. Doolittle, Ouaquaga; second prize, $5.

Cheshire Boar and Three Sows, Over One Year.

L. F. Doolittle, Ouaquaga; first prize, $12.
R. D. Button & Son, Cottons; second prize, $8.

Cheshire Boar and Three Sows, Under One Year.

L. F. Doolittle, Ouaquaga; first prize, $12.
R. D. Button & Son, Cottons; second prize, $8.

Cheshires — Four Swine, Get of the Same Boar.

L. F. Doolittle, Ouaquaga; first prize, $12.
R. D. Button & Son, Cottons; second prize, $8.

Cheshires — Four Pigs, Under Six Months, Produce of Same Sow.

L. F. Doolittle, Ouaquaga; first prize, $12.
R. D. Button & Son, Cottons; second prize, $8.

Cheshires — Championship Boar, Any Age.

L. F. Doolittle, Ouaquaga; first prize, $10.

Cheshires — Championship Sow, Any Age.

L. F. Doolittle, Ouaquaga; first prize, $10.

POLAND-CHINA.

Poland-China Boar, Two Years Old or Over.

F. B. Stewart, Espyville, Pa.; first prize, $12.
R. F. Seeley, Waterloo; second prize, $8.

Poland-China Boar, One Year Old and Under Two.

R. F. Seeley, Waterloo; first prize, $12.

Poland-China Boar, Six Months and Under One Year.

R. F. Seeley, Waterloo; first prize, $10.
R. F. Seeley, Waterloo; second prize, $5.

Poland-China Boar, Under Six Months.

F. B. Stewart, Espyville, Pa.; first prize, $10.
R. F. Seeley, Waterloo; second prize, $5.

Poland-China Sow, Two Years Old or Over.

R. F. Seeley, Waterloo; first prize, $12.

Poland-China Sow, One Year and Under Two.

F. B. Stewart, Espyville, Pa.; first prize, $12.
R. F. Seeley, Waterloo; second prize, $8.

Poland-China Sow, Six Months and Under One Year.

R. F. Seeley, Waterloo; first prize, $10.
R. F. Seeley, Waterloo; second prize, $5.

Poland-China Sow, Under Six Months.

R. F. Seeley, Waterloo; first prize, $10.

Poland-China Boar and Three Sows, Over One Year.

R. F. Seeley, Waterloo; first prize, $12.

Poland-China Boar and Three Sows, Under One Year.

R. F. Seeley, Waterloo; first prize, $12.

Poland-Chinas — Four Swine, Get of the Same Boar.

R. F. Seeley, Waterloo; first prize, $12.

Poland-Chinas — Four Pigs, Under Six Months, Produce of Same Sow.

R. F. Seeley, Waterloo; first prize, $12.

Poland-Chinas — Championship Boar, Any Age.

F. B. Stewart, Espyville, Pa.; first prize, $10.

Poland-Chinas — Championship Sow, Any Age.

F. B. Stewart, Espyville, Pa.; first prize, $10.

DUROC-JERSEY.

Duroc-Jersey Boar, Two Years Old or Over.

E. Campbell & Son, Pittsfield, O.; first prize, $12.
W. M. Benninger, Benningers, Pa.; second prize, $8.

Duroc-Jersey Boar, One Year Old and Under Two.

W. A. Alexander, Scipioville; first prize, $12.
W. A. Alexander, Scipioville; second prize, $8.

Duroc-Jersey Boar, Six Months and Under One Year.

B. A. Wyckoff, Fleming; first prize, $10.
W. M. Benninger, Benningers, Pa.; second prize, $5.

Duroc-Jersey Boar, Under Six Months.

E. Campbell & Son, Pittsfield, O.; first prize, $10.
B. A. Wyckoff, Fleming; second prize, $5.

Duroc-Jersey Sow, Two Years Old or Over.

E. Campbell & Son, Pittsfield, O.; first prize, $12.
W. M. Benninger, Benningers, Pa.; second prize, $8.

Duroc-Jersey Sow, One Year and Under Two.

W. A. Alexander, Scipioville; first prize, $12.
B. A. Wyckoff, Fleming; second prize, $8.

Duroc-Jersey Sow, Six Months and Under One Year.

W. A. Alexander, Scipioville; first prize, $10.
B. A. Wyckoff, Fleming; second prize, $5.

Duroc-Jersey Sow, Under Six Months.

E. Campbell & Son, Pittsfield, O.; first prize, $10.
B. A. Wyckoff, Fleming; second prize, $5.

Duroc-Jersey Boar and Three Sows, Over One Year.

E. Campbell & Son, Pittsfield, O.; first prize, $12.

Duroc-Jersey Boar and Three Sows, Under One Year.

E. Campbell & Son, Pittsfield, O.; first prize, $12.
B. A. Wyckoff, Fleming; second prize, $8.

Duroc-Jerseys — Four Swine, Get of the Same Boar.

E. Campbell & Son, Pittsfield, O.; first prize, $12.
B. A. Wyckoff, Fleming; second prize, $8.

Duroc-Jerseys — Four Pigs, Under Six Months, Produce of Same Sow.

B. A. Wyckoff, Fleming; first prize, $12.
W. M. Benninger, Benningers, Pa.; second prize, $8.

Duroc-Jerseys — Championship Boar, Any Age.

W. A. Alexander, Scipioville; first prize, $10.

Duroc-Jerseys — Championship Sow, Any Age.

W. A. Alexander, Scipioville; first prize, $10.

SMALL YORKSHIRE.

Small Yorkshire Boar, Two Years Old or Over.

James Blair, Hartstown, Pa.; first prize, $12.
F. B. Stewart, Espyville, Pa.; second prize, $8.

Small Yorkshire Boar, One Year Old and Under Two.

James Blair, Hartstown, Pa.; first prize, $12.
F. B. Stewart, Espyville, Pa.; second prize, $8.

Small Yorkshire Boar, Six Months and Under One Year.

F. B. Stewart, Espyville, Pa.; first prize, $10.

Small Yorkshire Boar, Under Six Months.

Averill & Gregory, Syracuse; first prize, $10.
F. B. Stewart, Espyville, Pa.; second prize, $5.

Small Yorkshire Sow, Two Years Old or Over.

F. B. Stewart, Espyville, Pa.; first prize, $12.
James Blair, Hartstown, Pa.; second prize, $8.

Small Yorkshire Sow, One Year Old and Under Two.

F. B. Stewart, Espyville, Pa.; first prize, $12.
James Blair, Hartstown, Pa.; second prize, $8.

Small Yorkshire Sow, Six Months and Under One Year.

F. B. Stewart, Espyville, Pa.; first prize, $10.
James Blair, Hartstown, Pa.; second prize, $5.

Small Yorkshire Sow, Under Six Months.

F. B. Stewart, Espyville, Pa.; first prize, $10.
Averill & Gregory, Syracuse; second prize, $5.

Small Yorkshire Boar and Three Sows, Over One Year.

F. B. Stewart, Espyville, Pa.; first prize, $12.
James Blair, Hartstown, Pa.; second prize, $8.

Small Yorkshire Boar and Three Sows, Under One Year.

F. B. Stewart, Espyville, Pa.; first prize, $12.
James Blair, Hartstown, Pa.; second prize, $8.

Small Yorkshires — Four Swine, Get of Same Boar.

F. B. Stewart, Espyville, Pa.; first prize, $12.
James Blair, Hartstown, Pa.; second prize, $8.

Small Yorkshires—Four Pigs, Under Six Months, Produce of Same Sow.

F. B. Stewart, Espyville, Pa.; first prize, $12.
James Blair, Hartstown, Pa.; second prize, $8.

Small Yorkshires — Championship Boar, Any Age.

F. B. Stewart, Espyville, Pa.; first prize, $10.

Small Yorkshires — Championship Sow, Any Age.

F. B. Stewart, Espyville, Pa.; first prize, $10.

LARGE YORKSHIRE.

Large Yorkshire Boar, Two Years Old or Over.

F. H. Latimer, Arkport; first prize, $12.
A. Vrooman, Champion; second prize, $8.

Large Yorkshire Boar, One Year Old and Under Two.

F. H. Latimer, Arkport; first prize, $12.
A. Vrooman, Champion; second prize, $8.

Large Yorkshire Boar, Six Months and Under One Year.

F. H. Latimer, Arkport; first prize, $10.
A. Vrooman, Champion; second prize, $5.

Large Yorkshire Boar, Under Six Months.

F. H. Latimer, Arkport; first prize, $10.
James Seeley, Geneva; second prize, $5.

Large Yorkshire Sow, Two Years or Over.

F. H. Latimer, Arkport; first prize, $12.
A. Vrooman, Champion; second prize, $8.

Large Yorkshire Sow, One Year and Under Two.

F. H. Latimer, Arkport; first prize, $12.
A. Vrooman, Champion; second prize, $8.

Large Yorkshire Sow, Six Months and Under One Year.

F. H. Latimer, Arkport; first prize, $10.
A. Vrooman, Champion; second prize, $5.

Large Yorkshire Sow, Under Six Months.

F. H. Latimer, Arkport; first prize, $10.
James Seeley, Geneva; second prize, $5.

Large Yorkshire Boar and Three Sows, Over One Year.

F. H. Latimer, Arkport; first prize, $12.
A. Vrooman, Champion; second prize, $8.

Large Yorkshire Boar and Three Sows, Under One Year.

F. H. Latimer, Arkport; first prize, $12.
A. Vrooman, Champion; second prize, $8.

Large Yorkshires — Four Swine, Get of Same Boar.

F. H. Latimer, Arkport; first prize, $12.
James Seeley, Geneva; second prize, $8.

Large Yorkshires—Four Pigs, Under Six Months, Produce of Same Sow.

F. H. Latimer, Arkport; first prize, $12.
James Seeley, Geneva; second prize, $8.

Large Yorkshires — Championship Boar, Any Age.

F. H. Latimer, Arkport; first prize, $10.

Large Yorkshires — Championship Sow, Any Age.

F. H. Latimer, Arkport; first prize, $10.

BERKSHIRE.

Berkshire Boar, Six Months and Under One Year.

Theo. W. Jones, Van Buren; first prize, $10.

Berkshire Boar, Under Six Months.

Theo. W. Jones, Van Buren; first prize, $10.

Berkshire Sow, Two Years Old or Over.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $12.
Theo. W. Jones, Van Buren; second prize, $8.

Berkshire Sow, One Year and Under Two.

B. A. Wyckoff, Fleming; first prize, $12.

Berkshire Sow, Six Months and Under One Year.

Theo. W. Jones, Van Buren; first prize, $10.

Berkshire Sow, Under Six Months.

Theo. W. Jones, Van Buren; first prize, $10.

Berkshires — Four Pigs, Under Six Months, Produce of Same Sow.

Theo. W. Jones, Van Buren; first prize, $12.

Berkshires—Championship Sow, Any Age.

B. A. Wyckoff, Fleming; first prize, $10.

ESSEX.

Essex Boar, Two Years Old or Over.

L. F. Doolittle, Ouaquaga; first prize, $12.
Wm. Lindsay & Son, Elizabeth, N. J.; second prize, $8.

Essex Boar, One Year Old and Under Two.

L. F. Doolittle, Ouaquaga; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Essex Boar, Six Months and Under One Year.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $10.
L. F. Doolittle, Ouaquaga; second prize, $5.

Essex Boar, Under Six Months.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $10.
R. D. Button & Son, Cottons; second prize, $5.

Essex Sow, Two Years or Over.

L. F. Doolittle, Ouaquaga; first prize, $12.
Wm. Lindsay & Son, Elizabeth, N. J.; second prize, $8.

Essex Sow, One Year and Under Two.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Essex Sow, Six Months and Under One Year.

L. F. Doolittle, Ouaquaga; first prize, $10.
Wm. Lindsay & Son, Elizabeth, N. J.; second prize, $5.

Essex Sow, Under Six Months.

L. F. Doolittle, Ouaquaga; first prize, $10.
L. F. Doolittle, Ouaquaga; second prize, $5.

Essex Boar and Three Sows, Over One Year.

L. F. Doolittle, Ouaquaga; first prize, $12.
Wm. Lindsay & Son, Elizabeth, N. J.; second prize, $8.

Essex Boar and Three Sows, Under One Year.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Essexs — Four Swine, Get of Same Boar.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $12.
L. F. Doolittle, Ouaquaga; second prize, $8.

Essexs — Four Pigs, Under Six Months, Produce of Same Sow.

L. F. Doolittle, Ouaquaga; first prize, $12.
Wm. Lindsay & Son, Elizabeth, N. J.; second prize, $8.

Essexs — Championship Boar, Any Age.

L. F. Doolittle, Ouaquaga; first prize, $10.

Essexs — Championship Sow, Any Age.

Wm. Lindsay & Son, Elizabeth, N. J.; first prize, $10.

VICTORIAS.

For the Best Herd of One Boar and Three Sows, All Over Six Months Old.

A. F. White, Hornellsville; first prize, $25.
Frank A. Van Ness, Baldwinsville; second prize, $15.

POULTRY.

AMERICAN.

Pen of Barred Plymouth Rocks.

W. S. Gardner, Philadelphia; first prize, $3.
Schwab Bros., Rochester; second prize, $2.

Cock.

W. S. Gardner, Philadelphia; first prize, $2.
Schwab Bros., Rochester; second prize, $1.

Hen.

Crescent Farm, Kent, Ohio; first prize, $2.
Schwab Bros., Rochester; second prize, $1.

Cockerel.

W. S. Gardner, Philadelphia; first prize, $2.
W. S. Gardner, Philadelphia; second prize, $1

Pullet.

W. S. Gardner, Philadelphia; first prize, $2.
Schwab Bros., Rochester; second prize, $1.

Pen of Buff Plymouth Rocks.

H. C. Foxton, Syracuse; first prize, $3.
M. L. Loner, East Onondaga; second prize, $2.

Cock.

H. E. Benedict, Elmira; first prize, $2.
J. O. Joslin, Tiashoke; second prize, $1.

Hen.

F. G. Bean, Fairview Village, Pa.; first prize, $2.
C .W. Beman, Binghamton; second prize, $1.

Cockerel.

H. E. Benedict, Elmira; first prize, $2.
C. W. Beman, Binghamton; second prize, $1.

Pullet.

F. G. Bean, Fairview Village, Pa.; first prize, $2.
H. E. Benedict, Elmira; second prize, $1.

Pen of White Plymouth Rocks.

W. S. Gardner, Philadelphia; first prize, $3.
C. W. Jerome & Co., Fabius; second prize, $2.

Cock.

T. Toogood & Sons, Rochester; first prize, $2.
C. W. Jerome & Co., Fabius; second prize, $1.

Hen.

F. G. Bean, Fairview Village, Pa.; first prize, $2.
W. S. Gardner, Philadelphia; second prize, $1.

Cockerel.

C. W. Jerome & Co., Fabius; first prize, $2.
W. S. Gardner, Philadelphia; second prize, $1.

Pullet.

C. W. Jerome & Co., Fabius; first prize, $2.
J. F. Hopkins, Caughdenoy; second prize, $1.

Silver Wyandotte Cock.

W. E. Samson & Son, Pleasant Mount, Pa.; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Hen.

F. G. Bean, Fairview Village, Pa.; first prize, $2.

Cockerel.

F. G. Bean, Fairview Village, Pa.; second prize, $1.

Pullet.

W. E. Samson & Son, Pleasant Mount, Pa.; first prize, $2.
W. E. Samson & Son, Pleasant Mount, Pa.; second prize, $1.

Pen of Golden Wyandottes.

Fred G. Mason, Fabius; first prize, $3.

Cock.

Fred G. Mason, Fabius; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

Fred G. Mason, Fabius; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Fred G. Mason, Fabius; first prize, $2.
Fred G. Mason, Fabius; second prize, $1.

Pullet.

Fred G. Mason, Fabius; first prize, $2.
Fred G. Mason, Fabius; second prize, $1.

Pen of White Wyandottes.

J. F. Hopkins, Caughdenoy; first prize, $3.
Knapp Bros., Fabius; second prize, $2.

Cock.

Knapp Bros., Fabius; first prize, $2.
J. M. Duncan, Silver Springs; second prize, $1.

Hen.

J. M. Duncan, Silver Springs, first prize, $2.
J. M. Duncan, Silver Springs; second prize, $1.

Cockerel.

Knapp Bros., Fabius; first prize, $2.
C. S. Phelps & Co., Homer; second prize, $1.

Pullet.

Knapp Bros., Fabius; first prize, $2.
J. F. Tallinger, Rochester; second prize, $1.

Pen of Buff Wyandottes.

J. F. Hopkins, Caughdenoy; first prize, $3.
F. W. Church, Belgium; second prize, $2

Cock.

F. W. Church, Belgium; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Hen.

F. W. Church, Belgium; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Cockerel.

F. W. Church, Belgium; first prize, $2.
J. O. Joslin, Tiashoke; second prize, $1.

Pullet.

F. W. Church, Belgium; first prize, $2.
J. F. Hopkins, Caughdenoy; second prize, $1.

Pen of Black Wyandottes.

F. W. Church, Belgium; first prize, $3.

Cock.

F. W. Church, Belgium; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

F. W. Church, Belgium; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

F. W. Church, Belgium; first prize, $2.
F. W. Church, Belgium; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
F. W. Church, Belgium; second prize, $1.

Pen of Black Javas.

James Seeley, Geneva; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
James Seeley, Geneva; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Mottled Javas.

C. W. Eno, Hannibal; first prize, $3.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.
C. W. Eno, Hannibal; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
C. W. Eno, Hannibal; second prize, $1.

Cockerel.

C. W. Eno, Hannibal; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
C. W. Eno, Hannibal; second prize, $1.

Dominique Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. E. Dolbear, Fulton; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
L. D. Atwater, Waverly; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
L. D. Atwater, Waverly; second prize, $1.

Pullet.

L. D. Atwater, Waverly; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Light Brahma Cock.

Geo. E. Pryor, Scranton, Pa.; first prize, $2.
Chas. P. Mittleton, Shelton, Conn.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
Chas. P. Mittleton, Shelton, Conn.; second prize, $1.

Cockerel.

Geo. E. Pryor, Scranton, Pa.; first prize, $2.
Chas. P. Mittleton, Shelton, Conn.; second prize, $1.

Pullet.

Chas. P. Mittleton, Shelton, Conn.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Dark Brahmas.

M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Cock.

W. A. Shafer, Oneonta; second prize, $1.

Hen.

W. A. Shafer, Oneonta; first prize, $2.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pen of Buff Cochins.

Crescent Farm, Kent, O.; first prize, $3.

Cock.

Crescent Farm, Kent, O.; first prize, $2.

Hen.

Crescent Farm, Kent, O.; first prize, $2.
Crescent Farm, Kent, O.; second prize, $1.

Cockerel.

Crescent Farm, Kent, O.; first prize, $2.
Crescent Farm, Kent, O.; second prize, $1.

Pullet.

Crescent Farm, Kent, O.; first prize, $2.
Crescent Farm, Kent, O.; second prize, $1.

Pen of White Cochins.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Black Cochin Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pen of Black Langshans.

Mrs. C. M. Kelley, Newark; first prize, $3.

Cock.

Warren Stevens, Ridgfield, Conn.; first prize, $2.
Mrs. C. M. Kelley, Newark; second prize, $1.

Hen.

Mrs. C. M. Kelley, Newark; first prize, $2.
Warren Stevens, Ridgefield, Conn.; second prize, $1.

Cockerel.

Warren Stevens, Ridgefield, Conn.: first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

Warren Stevens, Ridgefield, Conn.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of White Langshans.

Mrs. C. M. Kelley, Newark; first prize, $3.

Cock.

Mrs. C. M. Kelley, Newark; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Hen.

Mrs. C. M. Kelley, Newark; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Cockerel.

Mrs. C. M. Kelley, Newark; first prize, $2.
Mrs. C. M. Kelley, Newark; second prize, $1.

Pullet.

Mrs. C. M. Kelley, Newark; first prize, $2.
Mrs. C. M. Kelley, Newark; second prize, $1.

MEDITERRANEAN.

Pen of Brown Leghorns.

Chas. C. Ferris, De Witt; first prize, $3.
Chas. C. Ferris, De Witt; second prize, $2.

Cock.

Chas. C. Ferris, De Witt; first prize, $2.
Chas. C. Ferris, De Witt; second prize, $1.

Hen.

Chas. C. Ferris, De Witt; first prize, $2.
Chas. C. Ferris, De Witt; second prize, $1.

Cockerel.

Eugene La Munion, Solsville; first prize, $2.
Chas. C. Ferris, De Witt; second prize, $1.

Pullet.

Chas. C. Ferris, De Witt; first prize, $2.
Chas. C. Ferris, De Witt; second prize, $1.

Pen of Rose-Combed Brown Leghorns.

Fred Lampman, Cortland; first prize, $3.
R. D. Button & Son, Cottons; second prize, $2.

Cock.

Fred Lampman, Cortland; first prize, $2.

Hen.

Fred Lampman, Cortland; first prize, $2.

Cockerel.

R. D. Button & Son, Cottons; first prize, $2.
Fred Lampman, Cortland; second prize, $1.

Pullet.

R. D. Button & Son, Cottons; first prize, $2.
Fred Lampman, Cortland; second prize, $1.

Pen of White Leghorns.

Knapp Bros., Fabius; first prize, $3.
Crescent Farm, Kent, O.; second prize, $2.

Cock.

Knapp Bros., Fabius; first prize, $2.
Knapp Bros., Fabius; second prize, $1.

Hen.

Knapp Bros., Fabius; first prize, $2.
Irving F. Rice, Cortland; second prize, $1.

Cockerel.

C. S. Phelps & Co., Homer; first prize, $2.
Knapp Bros., Fabius; second prize, $1.

Pullet.

C. S. Phelps & Co., Homer; first prize, $2.
Irving F. Rice, Cortland; second prize, $1.

Pen of Rose-Combed White Leghorns.

Fred Lampman, Cortland; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
A. Coventry, Ridge Mills; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
A. Coventry, Ridge Mills; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

R. D. Button & Son, Cottons; first prize, $2.
Fred Lampman, Cortland; second prize, $1.

Black Leghorn Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
T. C. Stanton, Rochester; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.

Pen of Buff Leghorns.

A. W. Graham, Cortland; first prize, $3.

Cock.

L. D. Atwater, Waverly; first prize, $2.
Jay Keene, East Boston; second prize, $1.

Hen.

Jay Keene, East Boston; first prize, $2.
C. W. Beman, Binghamton; second prize, $1.

Cockerel.

A. W. Graham, Cortland; first prize, $2.
L. D. Atwater, Waverly; second prize, $1.

Pullet.

A. W. Graham, Cortland; first prize, $2.
L. D. Atwater, Waverly; second prize, $1.

Mottled Ancona Cock.

F. G. Bean, Fairview Village, Pa.; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Hen.

F. G. Bean, Fairview Village, Pa.; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Cockerel.

F. G. Bean, Fairview Village, Pa.; first prize, $2.
F. W. Church, Belgium; second prize, $1.

Pullet.

F. W. Church, Belgium; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Pen of Black Minorcas.

Judson H. Doane, Gouverneur; first prize, $3.

Cock.

Judson H. Doane, Gouverneur; first prize, $2.
James M. Carroll, Johnstown; second prize, $1.

Hen.

T. Toogood & Sons, Rochester; first prize, $2.
Judson H. Doane, Gouverneur; second prize, $1.

Cockerel.

Judson H. Doane, Gouverneur; first prize, $2.
J. W. Garlick & Son, Rome; second prize, $1.

Pullet.

J. W. Garlick & Son, Rome; first prize, $2.
F. G. Bean, Fairview Village, Pa.; second prize, $1.

Pen of White Minorcas.

C. W. Jerome & Co., Fabius; first prize, $3.
C. W. Jerome & Co., Fabius; second prize, $2.

Cock.

C. W. Jerome & Co., Fabius; first prize, $2.
Mrs. J. G. Osborne, Fabius; second prize, $1.

Hen.

C. W. Jerome & Co., Fabius; first prize, $2.
C. W. Jerome & Co., Fabius; second prize, $1.

Cockerel.

C. W. Jerome & Co., Fabius; first prize, $2.
C. W. Jerome & Co., Fabius; second prize, $1.

Pullet.

C. W. Jerome & Co., Fabius; first prize, $2.
C. W. Jerome & Co., Fabius; second prize, $1.

Pen of Andalusians.

Mrs. Kate C. Marsh, West Haven, Conn.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. E. Dolbear, Fulton; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Mrs. Kate C. Marsh, West Haven, Conn.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
Mrs. Kate C. Marsh, West Haven, Conn.; second prize, $1.

Black Spanish Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

POLISH.

Pen of White-Crested Black Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
B. F. Bryant, Johnson Creek; second prize, $1.

Hen.

B. F. Bryant, Johnson Creek; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of Golden Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pen of Silver Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of White Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
G. A. Bell, Rome; second prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

B. F. Bryant, Johnson Creek; first prize, $2.
B. F. Bryant, Johnson Creek; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
G. A. Bell, Rome; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Golden-Bearded Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Belmont Farm, Newark, Del.; second prize, $2.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Silver-Beared Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of White-Bearded Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Buff-Laced Polish.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
B. F. Bryant, Johnson Creek; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

HAMBURGHS.

Pen of Golden Spangled Hamburghs.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Silver Spangled Hamburghs.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
R. F. Seeley, Waterloo; second prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
James Mayo, Pittston, Pa.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of Golden Penciled Hamburghs.

W. B Sherry, Stony Brook; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. E. Dolbear, Fulton; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Silver Penciled Hamburghs.

M. T Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; second prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

White Hamburgh Cock.

M. E. Dolbear, Fulton; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. E. Dolbear, Fulton; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. E. Dolbear, Fulton; second prize, $1.

Pen of Black Hamburghs.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark Del.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Red Cap Cock.

Belmont Farm, Newark, Del.; first prize, $2.
W. A. Shafer, Oneonta; second prize, $1.

Hen.

W. A. Shafer, Oneonta; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

FRENCH.

Pen of Houdans.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.

Creve Coeur Cock.

Belmont Farm, Newark, Del.; first prize, $2.
J. M. Seymour, Clark's Mills; second prize, $1.

Hen.

J. M. Seymour, Clark's Mills; first prize, $2.

Pen of La Fleche.

W. B. Sherry, Stony Brook; first prize, $3.

Cock.

W. B. Sherry, Stony Brook; first prize, $2.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
W. B. Sherry, Stony Brook; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
W. B. Sherry, Stony Brook; second prize, $1.

ENGLISH.

Pen of White Dorkings.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Miss Lizzie Goodell, Canastota; second prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Miss Lizzie Goodell, Canastota; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

Miss Lizzie Goodell, Canastota; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of Silver Gray Dorkings.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Miss Lizzie Goodell, Canastota; second prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
Miss Lizzie Goodell, Canastota; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of Colored Dorkings.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Miss Lizzie Goodell, Canastota; second prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Miss Lizzie Goodell, Canastota; second prize, $1.

Cockerel.

Miss Lizzie Goodell, Canastota; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Miss Lizzie Goodell, Canastota; second prize, $1.

GAMES.

Pen of Black-Breasted Red Games.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Brown-Red Game Cock.

Belmont Farm, Newark, Del.; first prize, $2.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.

Pen of Silver Duck-Wing Games.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pen of Golden Duck-Wing Games.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pullet.

John Glasgow, Mahwah, N. J.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pen of Red Pile Games.

M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.

Birchen Game Cock.

Belmont Farm, Newark, Del.; first prize, $2.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.

Pen of Pit Games.

R. Chant & Co., Johnstown; first prize, $3.

Cock.

A. N. Fay, Onondaga; first prize, $2.
A. N. Fay, Onondaga; second prize, $1.

Hen.

A. N. Fay, Onondaga; first prize, $2.
R. Chant & Co., Johnstown; second prize, $1.

Cockerel.

R. Chant & Co., Johnstown; first prize, $2.

Pullet.

R. Chant & Co., Johnstown; first prize, $2.

ORIENTAL GAMES.

Pen of Indian Games.

R. D. Button & Son, Cottons; second prize, $2.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
R. D. Button & Son, Cottons; second prize, $1.

Pen of White Indian Games.

D. Lincoln Orr, Orr's Mills; first prize, $2.

Cock.

D. Lincoln Orr, Orr's Mills; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
D. Lincoln Orr, Orr's Mills, second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
F. W. Church, Belgium; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
F. W. Church, Belgium; second prize, $1.

Malay Game Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Black Sumatra Game Cock.

M. E. Dolbear, Fulton; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

T. C. Stanton, Rochester; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

T. C. Stanton, Rochester; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

GAME BANTAMS.

Pen of Black-Breasted Red Game Bantams.

A. E. Blunck, Johnstown; first prize, $3.
W. J. Greenman, Cortland; second prize, $2.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Cockerel.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Pullet.

John Glasgow, Mahwah, N. J.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Pen of Brown-Red Game Bantams.

A. E. Blunck, Johnstown; first prize, $3.
W. J. Greenman, Cortland; second prize, $2.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

W. J. Greenman, Cortland; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Pullet.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Silver-Wing Game Bantam Cock.

Belmont Farm, Newark, Del.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

A. E. Blunck, Johnstown; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Pullet.

W. J. Greenman, Cortland; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Pen of Gold Duck-Wing Game Bantams.

W. J. Greenman, Cortland; first prize, $3.

Cock.

W. J. Greenman, Cortland; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

John Glasgow, Mahwah, N. J.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Pullet.

John Glasgow, Mahwah, N. J.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Pen of Red Pile Game Bantams.

A. E. Blunck, Johnstown; first prize, $3.

Cock.

A. E. Blunck, Johnstown; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

John Glasgow, Mahwah, N. J.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Pullet.

A. E. Blunck, Johnstown; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Pen of Birchen Game Bantams.

W. J. Greenman, Cortland; first prize, $3.
A. E. Blunck, Johnstown; second prize, $2.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Hen.

Stem & Bros., Easton, Pa.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

John Glasgow, Mahwah, N. J.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Pen of Any Other Variety Game Bantam Cock.

John Glasgow, Mahwah, N. J.; first prize, $3.
John Glasgow, Mahwah, N. J.; second prize, $2.

Any Other Variety Game Bantam Hen.

A. E. Blunck, Johnstown; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Any Other Variety Game Bantam Cockerel.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Any Other Variety Game Bantam Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

BANTAMS (OTHER THAN GAME).

Pen of Golden Seabright.

A. E. Blunck, Johnstown; first prize, $3.
Stem & Bros., Easton, Pa.; second prize, $2.

Cock.

Belmont Farm, Newark, Del.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Hen.

A. E. Blunck, Johnstown; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

A. E. Blunck, Johnstown; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Pullet.

A. E. Blunck, Johnstown; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Silver Seabright Cock.

H. J. Quilhot, Johnstown; first prize, $2.
H. J. Quilhot, Johnstown; second prize, $1.

Hen.

A. C. Treichler, Elizabethtown, Pa.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
A. C. Treichler, Elizabethtown, Pa.; second prize, $1.

Pullet.

A. C. Treichler, Elizabethtown, Pa.; first prize, $2.
A. C. Treichler, Elizabethtown, Pa.; second prize, $1.

Pen of Rose-Combed Black.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
W. J. Greenman, Cortland; second prize, $2.

Cock.

H. J. Quilhot, Johnstown; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

H. J. Quilhot, Johnstown; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Pullet.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Pen of Rose-Combed White.

H. J. Quilhot, Johnstown; first prize, $3.

Cock.

Geo. H. Leh, Allentown, Pa.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Hen.

Geo. H. Leh, Allentown, Pa.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Cockerel.

H. J. Quilhot, Johnstown; first prize, $2.
Geo. H. Leh, Allentown, Pa.; second prize, $1.

Booted White Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
W. J. Greenman, Cortland; second prize, $1.

Hen.

W. J. Greenman, Cortland; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.

Black-Tailed Japanese Bantam Cock.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

John Glasgow, Mahwah, N. J.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Pullet.

John Glasgow, Mahwah, N. J.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

White Japanese Bantam Cock.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Hen.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
Belmont Farm, Newark, Del.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Black Japanese Bantam Cock.

Belmont Farm, Newark, Del.; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

Belmont Farm, Newark, Del.; first prize, $2.

Pullet.

Belmont Farm, Newark, Del.; second prize, $1.

Pen of Buff Cochin Bantams.

J. F. Kirkpatrick, Easton, Pa.; first prize, $3.
W. J. Greenman, Cortland; second prize, $2.

Cock.

J. F. Kirkpatrick, Easton, Pa.; first prize, $2.
Stem & Bros., Easton, Pa.; second prize, $1.

Hen.

J. F. Kirkpatrick, Easton, Pa.; first prize, $2.
John Glasgow, Mahwah, N. J.; second prize, $1.

Cockerel.

W. J. Greenman, Cortland; first prize, $2.
H. J. Quilhot, Johnstown; second prize, $1.

Pullet.

J. F. Kirkpatrick, Easton, Pa.; first prize, $2.
J. F. Kirkpatrick, Easton, Pa.; second prize, $1.

Pen of Partridge Cochin Bantams.

M. M. Fullerton, Leonia, N. J.; first prize, $3.

Cock.

Elmwood Farm, Weston, N. J.; first prize, $2.

Hen.

Elmwood Farm, Weston, N. J.; first prize, $2.

Cockerel.

Elmwood Farm, Weston, N. J.; first prize, $2.

Pullet.

Elmwood Farm, Weston, N. J.; first prize, $2.

Pen of White Cochin Bantams.

A. E. Blunck, Johnstown; first prize, $3.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
W. A. Shafer, Oneonta; second prize, $1.

Hen.

Belmont Farm, Newark, Del.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Cockerel.

A. E. Blunck, Johnstown; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Pullet.

Elmwood Farm, Weston, N. J.; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Pen of Black Cochin Bantams.

W. J. Greenman, Cortland; first prize, $3.
J. F. Kirkpatrick, Easton, Pa.; second prize, $2.

Cock.

A. E. Blunck, Johnstown; first prize, $2.
Elmwood Farm, Weston, N. J.; second prize, $1.

Hen.

Stem & Bros., Easton, Pa.; first prize, $2.
Geo. H. Leh, Allentown, Pa.; second prize, $1.

Cockerel.

J. F. Kirkpatrick, Easton, Pa.; first prize, $2.
M. T. Burn, Tilsonburg, Ont.; second prize, $1.

Pullet.

J. F. Kirkpatrick, Easton, Pa.; first prize, $2.
J. F. Kirkpatrick, Easton, Pa.; second prize, $1.

Pen of White-Crested White Polish.

A. E. Blunck, Johnstown; first prize, $3.

Cock.

A. E. Blunck, Johnstown; first prize, $2.
A. E. Blunck, Johnstown; second prize, $1.

Pen of Light Brahma Bantams.

D. Lincoln Orr, Orr's Mills; first prize, $3.

Cock.

John Glasgow, Mahwah, N. J.; first prize, $2.
D. Lincoln Orr, Orr's Mills; second prize, $1.

Hen.

John Glasgow, Mahwah, N. J.; first prize, $2.
D. Lincoln Orr, Orr's Mills; second prize, $1.

Cockerel.

Elmwood Farm, Weston, N. J.; first prize, $2.

Pullet.

Elmwood Farm, Weston, N. J.; second prize, $1.

Pen of Dark Brahma Bantams.

M. M. Fullarton, Leonia, N. J.; first prize, $3.

Cock.

Geo. H. Leh, Allentown, Pa.; first prize, $2.

Cockerel.

Elmwood Farm, Weston, N. J.; first prize, $2.

Pullet.

Elmwood Farm, Weston, N. J.; first prize, $2.

MISCELLANEOUS.

Pair Silkies.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
A. E. Blunck, Johnstown; second prize, $2.

Pair Sultans.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.

Pair Frizzled.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Mrs. Kate C. Marsh, West Haven, Conn.; second prize, $2.

Pair Rumpless.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
R. F. Seeley, Waterloo; second prize, $2.

ORNAMENTAL FOWL.

Pair Guinea Fowls, Pearl.

R. F. Seeley, Waterloo; first prize, $3.
W. A. Shafer, Oneonta; second prize, $2.

Pair Guinea Fowls, White.

W. B. Sherry, Stony Brook; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Pair Pea Fowls.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
G. A. Bell, Rome; second prize, $2.

Pair Golden Pheasants.

T. Toogood & Sons, Rochester; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Pair Silver Pheasants.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Wheeler Stock Farm, Greenway; second prize, $2.

Pair English Pheasants.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
W. B. Sherry, Stony Brook; second prize, $2.

Any Other Variety Pheasants.

T. Toogood & Sons, Rochester; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

TURKEYS.

Pair Bronze.

G. A. Bell, Rome; first prize, $3.
R. F. Seeley, Waterloo; second prize, $2.

Pair Slate.

C. W. Eno, Hannibal; first prize, $3.

Pair White.

G. A. Bell, Rome; first prize, $3.
R. F. Seeley, Waterloo; second prize, $2.

GEESE.

Pair Toulouse.

James Seeley, Geneva; first prize, $3.
James Seeley, Geneva; second prize, $2.

Pair Embden.

W. B. Sherry, Stony Brook; first prize, $3.
Belmont Farm, Newark, Del.; second prize, $2.

Pair African.

W. B. Sherry, Stony Brook; first prize, $3.
Belmont Farm, Newark, Del.; second prize, $2.

Pair Chinese Brown.

W. B. Sherry, Stony Brook; first prize, $3.
Belmont Farm, Newark, Del.; second prize, $2.

Pair Chinese White.

Belmont Farm, Newark, Del.; first prize, $3.
W. A. Shafer, Oneonta; second prize, $2.

Pair Wild or Canada.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
W. A. Shafer, Oneonta; second prize, $2.

Pair Egyptian.

Belmont Farm, Newark, Del.; first prize, $3.
W. B. Sherry, Stony Brook; second prize, $2.

DUCKS.

Pair Pekin.

R. F. Seeley, Waterloo; first prize, $3.
A. Coventry, Ridge Mills; second prize, $2.

Pair Aylesbury.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
Belmont Farm, Newark, Del.; second prize, $2.

Pair Rouen.

M. T. Burn, Tilsonburg, Ont.; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Pair Cayuga.

Belmont Farm, Stony Brook; first prize, $3.
R. D. Button, Cottons; second prize, $2.

Pair Call Gray.

W. A. Shafer, Oneonta; first prize, $3.
R. D. Button, Cottons; second prize, $2.

Pair Call White.

W. B. Sherry, Stony Brook; first prize, $3.
W. B. Sherry, Stony Brook; second prize, $2.

Pair East India.

W. B. Sherry, Stony Brook; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Pair Crested.

W. B. Sherry, Stony Brook; first prize, $3.
W. B. Sherry, Stony Brook; second prize, $2.

Pair Indian Runner.

W. B. Sherry, Stony Brook; first prize, $3.
W. B. Sherry, Stony Brook; second prize, $2.

Pair Colored Muscovy.

W. B. Sherry, Stony Brook; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

Pair White Muscovy.

W. B. Sherry, Stony Brook; first prize, $3.
M. T. Burn, Tilsonburg, Ont.; second prize, $2.

PIGEONS.

Pair Black Carriers.

Edward Galster, Syracuse; first prize, $1.

Pair Dun Carriers.

B. A. Ferris & Son, Auburn; first prize, $1.
Edward Galster, Syracuse; second prize, 50 cents.

Pair Any Other Color Carriers.

Edward Galster, Syracuse; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Black Barbs.

M. E. Dolbear, Fulton; first prize, $1.
Edward Galster, Syracuse; second prize, 50 cents.

Pair Red Barbs.

Edward Galster, Syracuse; first prize, $1.

Pair Any Other Color Barbs.

W. B. Sherry, Stony Brook; first prize, $1.
Edward Galster, Syracuse; second prize, 50 cents.

Pair Black Jacobins.

L. D. Holmes, Syracuse; first prize, $1.
H. C. Foxton, Syracuse; second prize, 50 cents.

Pair Red Jacobins.

L. D. Holmes, Syracuse; first prize, $1.
L. D. Holmes, Syracuse; second prize, 50 cents.

Pair Yellow Jacobins.

L. D. Holmes, Syracuse; first prize, $1.
L. D. Holmes, Syracuse; second prize, 50 cents.

Pair White Jacobins.

L. D. Holmes, Syracuse; first prize, $1.
L. D. Holmes, Syracuse; second prize, 50 cents.

Pair Black-Winged Turbits.

B. A. Ferris & Son, Auburn; first prize, $1.
H. C. Foxton, Syracuse; second prize, 50 cents.

Pair Red-Winged Turbits.

W. B. Sherry, Stony Brook; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Yellow-Winged Turbits.

B. A. Ferris & Son, Auburn; first prize, $1.
W. B. Sherry, Stony Brook; second prize, 50 cents.

Pair Blue-Winged Turbits.

B. A. Ferris & Son, Auburn; first prize, $1.
H. C. Foxton, Syracuse; second prize, 50 cents.

Pair Any Other Color Turbits.

B. A. Ferris & Son, Auburn; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair White Fantails.

B. A. Ferris & Son, Auburn; first prize, $1.
H. C. Foxton, Syracuse; second prize, 50 cents.

Pair Yellow Fantails.

W. B. Sherry, Stony Brook; first prize, $1.
H. C. Foxton, Syracuse; second prize, 50 cents.

Pair Black Fantails.

B. A. Ferris & Son, Auburn; first prize, $1.
Edward Galster, Syracuse; second prize, 50 cents.

Pair Red Fantails.

Edward Galster, Syracuse; first prize, $1.

Pair Blue Fantails.

Edward Galster, Syracuse; first prize, $1.

Pair White Owls.

M. E. Dolbear, Fulton; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Blue or Silver Owls.

B. A. Ferris & Son, Auburn; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Almond Tumblers.

B. A. Ferris & Son, Auburn; first prize, $1.

Pair Short-Face Tumblers, Any Color.

B. A. Ferris & Son, Auburn; first prize, $1.
T. Toogood & Son, Rochester; second prize, 50 cents.

Pair Long-Face Tumblers, Any Color.

B. A. Ferris & Son, Auburn; first prize, $1.
H. C. Foxton, Syracuse; second prize, 50 cents.

Pair Baldheads, Any Color.

W. B. Sherry, Stony Brook; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Antwerp or Homing, Any Color.

T. Toogood & Sons, Rochester; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Swallows, Any Color.

Edward Galster, Syracuse; first prize, $1.
M. E. Dolbear, Fulton; second prize, 50 cents.

Pair Magpies, Any Color.

B. A. Ferris & Son, Auburn; first prize, $1.
T. C. Stanton, Rochester; second prize, 50 cents.

Pair Nuns, Any Color.

B. A. Ferris & Son, Auburn; first prize, $1.
B. A. Ferris & Son, Auburn; second prize, 50 cents.

Pair Pigmy Pouters.

H. C. Foxton, Syracuse; first prize, $1.

Pair Dragoons, Any Color.

B. A. Ferris & Son, Auburn; first prize, $1.
T. Toogood & Sons, Rochester; second prize, 50 cents.

Pair Oriental Frills.

W. B. Sherry, Stony Brook; first prize, $1.
W. B. Sherry, Stony Brook; second prize, 50 cents.

RABBITS.

Pair Angora.

M. T. Burn, Tilsonburg, Ont.; first prize, $2.
T. Toogood & Sons, Rochester; second prize, $1.

Pair Belgian.

T. Toogood & Sons, Rochester; first prize, $2.

SPECIAL PRIZES.

For Largest and Best Collection of Poultry Owned By One Exhibitor.

M. T. Burn, Tilsonburg, Ont.; first prize, $50.

Second Best Collection.

Belmont Farm, Newark, Del.; first prize, $30.

Third Best Collection.

John Glasgow, Mahwah, N. J.; first prize, $20.

Best Collection, American Classes—Prize Divided.

Belmont Farm, Newark, Del.; $7.50.
F. W. Church, Belgium; $7.50.

For Best Display of Any One Variety in American Classes.

F. W. Church, Belgium; first prize, $5.

Best Collection, Asiatic Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.
Crescent Farm, Kent, O.; second prize, $5.

For Best Display of Any One Variety in Asiatic Classes —Prize Divided.

M. T. Burn, Tilsonburg, Ont.; $2.50.
Crescent Farm, Kent, O.; $2.50.

Best Collection, Mediterranean Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.
Belmont Farm, Newark, Del.; second prize, $5.

Best Display of Any One Variety in Mediterranean Classes.

C. W. Jerome & Co., Fabius; first prize, $5.

Best Collection, Polish Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.
Belmont Farm, Newark, Del.; second prize, $5.

Best Display of Any One Variety in Polish Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $5.

Best Collection, Hamburgh Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.
Belmont Farm, Newark, Del.; second prize, $5.

Best Display Any One Variety in Hamburgh Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $5.

Best Collection, French Classes.

Belmont Farm, Newark, Del.; first prize, $10.
W. B. Sherry, Stony Brook; second prize, $5.

Best Display Any One Variety in French Classes.

Belmont Farm, Newark, Del.; first prize, $5.

Best Collection, English Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.
Miss Lizzie Goodell, Canastota; second prize, $5.

Best Display Any One Variety in English Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $5.

Best Collection in Game Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.
Belmont Farm, Newark, Del.; second prize, $5.

Best Display of Any One Variety in Game Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $5.

Best Collection, Oriental Games.

Belmont Farm, Newark, Del.; first prize, $5.

Best Collection, Game Bantam Classes.

John Glasgow, Mahwah, N. J.; first prize, $10.
A. E. Blunck, Johnstown; second prize, $5.

Best Display of Any One Variety of Game Bantams.

John Glasgow, Mahwah, N. J.; first prize, $5.

Best Collection of Bantams Other than Game.

Belmont Farm, Newark, Del.; first prize, $10.
A. E. Blunck, Johnstown; second prize, $5.

Best Display of Seabright Bantams.

A. E. Blunck, Johnstown; first prize, $5.

Best Display of Rose-Combed Bantams.

H. J. Quilhot, Johnstown; first prize, $5.

Best Display Japanese Bantams.

Belmont Farm, Newark, Del.; first prize, $5.

Best Display Cochin Bantams.

J. F. Kirkpatrick, Easton, Pa.; first prize, $5.

Best Display in Miscellaneous Classes.

M. T. Burn, Tilsonburg, Ont.; first prize, $5.

Best Collection of Turkeys.

G. A. Bell, Rome; first prize, $10.
Second prize divided:
R. F. Seeley, Waterloo; $2.50.
C. W. Eno, Hannibal; $2.50.

Best Collection Geese — Prizes Divided.

Belmont Farm, Newark, Del.; $7.50.
W. B. Sherry, Stony Brook; $7.50.

Best Collection Ducks.

W. B. Sherry, Stony Brook; first prize, $10.
M. T. Burn, Tilsonburg, Ont.; second prize, $5.

Best Display of Any One Variety in Duck Classes — Prize Divided.

W. B. Sherry, Stony Brook; $2.50.
M. T. Burn, Tilsonburg, Ont.; $2.50.

Best Display of Pheasants, Not Less Than Five Varieties.

M. T. Burn, Tilsonburg, Ont.; first prize, $10.

Best Display of Pigeons, Not Less Than Ten Varieties.

B. A. Ferris & Son, Auburn; first prize, $5.
Second prize divided:
Edward Galster, Syracuse; $1.50.
W. B. Sherry, Stony Brook; $1.50.

Best Display of Any One Variety of Pigeons.

L. D. Holmes, Syracuse; first prize, $5.

FARM PRODUCE.

GRAIN, SEEDS, HOPS GROWN IN 1899.

One-half Bushel Standard White Winter Wheat.

M. F Pierson, Seneca Castle; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.
C. Coolidge, Phelps; third prize, $1.

One-half Bushel New Variety White Winter Wheat.

M. F. Pierson, Seneca Castle; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.
James Miller, Penn Yan; third prize, $1.

One-half Bushel Standard Red Winter Wheat.

O. M. Lincoln, Newark; first prize, $3.
M. F. Pierson, Seneca Castle; second prize, $2.

One-half Bushel New Variety Red Winter Wheat.

M. F. Pierson, Seneca Castle; first prize, $3.
C. Coolidge, Phelps; second prize, $2.
O. M. Lincoln, Newark; third prize, $1.

One-half Bushel Red Spring Wheat.

O. M. Lincoln, Newark; first prize, $3.
J. C. Howard, Rochester; second prize, $2.
R. F. Seeley, Waterloo; third prize, $1.

One-half Bushel Rye, Dark.

M. F. Pierson, Seneca Castle; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.

One-half Bushel Rye, White.

O. M. Lincoln, Newark; first prize, $3.
M. F. Pierson, Seneca Castle; second prize, $2.

One-half Bushel Six-Rowed Barley.

O. M. Lincoln, Newark; first prize, $3.
J. C. Howard, Rochester; second prize, $2.

One-half Bushel Two-Rowed Barley.

O. M. Lincoln, Newark; first prize, $3.

One-half Bushel Heavy-Weight White Oats.

John McCann, Elmira; first prize, $3.
M F. Pierson, Seneca Castle; second prize, $2.
Francis Peck, Albury, Ont.; third prize, $1.

One-half Bushel Light-Weight Oats.

M. F. Pierson, Seneca Castle; first prize, $3.
R. F. Seeley, Waterloo; second prize, $2.
C. Coolidge, Phelps; third prize, $1.

One-half Bushel Black or Gray Oats.

Francis Peck, Albury, Ont.; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.
C. Coolidge, Phelps; third prize, $1.

One-half Bushel Millet.

M. F. Pierson, Seneca Castle; first prize, $3.
C. Coolidge, Phelps; second prize, $2.
J. C. Howard, Rochester; third prize, $1.

One-half Bushel Hungarian Grass.

C. Coolidge, Phelps; first prize, $3.
J. C. Howard, Rochester; second prize, $2.

Ten Stalks, with Ears, for Ensilage.

C. Coolidge, Phelps; first prize, $3.
M. F. Pierson, Seneca Castle; second prize, $2.
Skiff Bros., Syracuse; third prize, $1.

GROWN IN 1898.

One-half Bushel Large Marrowfat Beans.

W. H. Pillow, Reed's Corners; first prize, $2.
H. A. Lamphere, Weedsport; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

One-half Bushel Pea Marrowfat Beans.

R. G. King, Lafayette; first prize, $2.
W. H. Pillow, Reed's Corners; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

One-half Bushel White Kidney Beans.

J. C. Howard, Rochester; first prize, $2.
O. M. Lincoln, Newark; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

One-half Bushel Red Kidney Beans.

W. H. Pillow, Reed's Corners; first prize, $2.
O. M. Lincoln, Newark; second prize, $1.

One-half Bushel Gold Eye Beans.

O. M. Lincoln, Newark; second prize, $1.

One-half Bushel Large Field Peas.

Francis Peck, Albury, Ont.; first prize, $2.
H. A. Lamphere, Weedsport; second prize, $1.

One-half Bushel Small Field Peas.

John McCann, Elmira; first prize, $2.
Frank A. Van Ness, Baldwinsville; second prize, $1.
J. C. Howard, Rochester; third prize, 50 cents.

One-half Bushel Japanese Buckwheat.

W. H. Pillow, Reed's Corners; first prize, $2.
O. M. Lincoln, Newark; second prize, $1.
J. C. Howard, Rochester; third prize, 50 cents.

One-half Bushel Gray or Silver Buckwheat.

O. M. Lincoln, Newark; first prize, $2.
M. F. Pierson, Seneca Castle; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

One-half Bushel Red Clover.

J. C. Howard, Rochester; first prize, $2.

One-half Bushel Crimson Clover.

M. F. Pierson, Seneca Castle; first prize, $2.

One-half Bushel Alsike Clover.

J. C. Howard, Rochester; first prize, $2.

One-half Bushel Timothy Seed.

H. A. Lamphere, Weedsport; first prize, $2.
J. C. Howard, Rochester; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

One-half Bushel Flax Seed.

W. H. Pillow, Reed's Corners; first prize, $2.

One-half Bushel Amber Cane Seed.

W. H. Pillow, Reed's Corners; first prize, $2.

One-half Bushel White Flint Corn, Shelled.

R. G. King, Lafayette; first prize, $2.
O. M. Lincoln, Newark; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

One-half Bushel Yellow Flint Corn, Shelled.

C. Coolidge, Phelps; first prize, $2.
R. F. Seeley, Waterloo; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

One-half Bushel White Dent Corn, Shelled.

C. Coolidge, Phelps; first prize, $2.
O. M. Lincoln, Newark; second prize, $1.
John McCann, Elmira; third prize, 50 cents.

One-half Bushel Yellow Dent Corn, Shelled.

John McCann, Elmira; first prize, $2.
C. Coolidge, Phelps; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Largest Exhibit of Ears of Corn, Ten Ears of Each.

M. F. Pierson, Seneca Castle; first prize, $5.
H. A. Lamphere, Weedsport; second prize, $3.

Twelve Ears Yellow Flint Corn, Eight-Rowed.

Frank A. Van Ness, Baldwinsville; first prize, $3.
E. Van Allen, Delmar; second prize, $2.
O. M. Lincoln, Newark; third prize, $1.

Twelve Ears Yellow Flint Corn, Twelve-Rowed.

C. Coolidge, Phelps; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.

Twelve Ears White Flint Corn, Eight-Rowed.

E. Van Allen, Delmar; first prize, $3.
Frank A. Van Ness, Baldwinsville; second prize, $2.
C. Coolidge, Phelps; third prize, $1.

Twelve Ears White Flint Corn, Twelve-Rowed.

C. Coolidge, Phelps; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.

Twelve Ears White Dent Corn.

R. N. Lewis, Red Hook; first prize, $3.
C. Coolidge, Phelps; second prize, $2.
M. F. Pierson, Seneca Castle; third prize, $1.

Twelve Ears Yellow Dent Corn.

R. N. Lewis, Red Hook; first prize, $3.
C. Coolidge, Phelps; second prize, $2.
Julia M. Strong, Onondaga; third prize, $1.

Twelve Ears Large Ensilage Dent Corn.

C. Coolidge, Phelps; first prize, $3.
M. F. Pierson, Seneca Castle; second prize, $2.
O. M. Lincoln, Newark; third prize, $1.

Twelve Ears Early Sweet Corn.

Charles Swaffer, East Onondaga; first prize, $3.
C. Coolidge, Phelps; second prize, $2.
A. Donald, Elmira; third prize, $1.

Twelve Ears Late Sweet Corn.

A. Donald, Elmira; first prize, $3.
L. B. Babcock, Volney; second prize, $2.
Julia M. Strong, Onondaga; third prize, $1.

Twelve Ears White Rice Corn.

A. Donald, Elmira; first prize, $3.
O. M. Lincoln, Newark; second prize, $2.
John McCann, Elmira; third prize, $1.

Twelve Ears of Any Other Pop Corn.

Lyman James, Onondaga Valley; first prize, $3.
W. Robert Dunlop, Fayetteville; second prize, $2.
Charles Swaffer, East Onondaga; third prize, $1.

Twelve Heads Amber Cane.

R. N. Lewis, Red Hook; first prize, $3.
W. H. Pillow, Reed's Corners; second prize, $2.

VEGETABLES.

Five Varieties Celery.

J. C. Howard, Rochester; first prize, $4.

Five Varieties Cabbage.

C. W. Eno, Hannibal; first prize, $4.
E. Van Allen, Delmar; second prize, $2.
W. H. Pillow, Reed's Corners; third prize, $1.

Five Varieties Lettuce.

E. Van Allen, Delmar; first prize, $4.

Five Varieties Turnips.

E. Van Allen, Delmar; second prize, $2.
J. E. Murphy, Clockville; third prize, $1.

Five Varieties Beets.

W. H. Pillow, Reed's Corners; first prize, $4.
C. Coolidge, Phelps; second prize, $2.
E. Van Allen, Delmar; third prize, $1.

Five Varieties Mangolds.

J. E. Murphy, Clockville; first prize, $4.
A. Donald, Elmira; second prize, $2.
Glendale Farm, Glens Falls; third prize, $1.

Five Varieties Carrots.

J. E. Murphy, Clockville; first prize, $4.
C. Coolidge, Phelps; second prize, $2.
E. Van Allen, Delmar; third prize, $1.

Five Varieties Radishes, Summer.

J. E. Murphy, Clockville; first prize, $4.
E. Van Allen, Delmar; second prize, $2.
J. C. Howard, Rochester; third prize, $1.

Five Varieties Radishes, Winter.

E. Van Allen, Delmar; first prize, $4.
R. N. Lewis, Red Hook; second prize, $2.
J. C. Howard, Rochester; third prize, $1.

Five Varieties Onions.

Glendale Farm, Glens Falls; first prize, $4.
J. E. Murphy, Clockville; second prize, $2.
J. C. Howard, Rochester; third prize, $1.

Ten Varieties Tomatoes.

Glendale Farm, Glens Falls; first prize, $4.
A. Donald, Elmira; second prize, $2.
E. Van Allen, Delmar; third prize, $1.

Ten Varieties Peppers.

E. Van Allen, Delmar; first prize, $4.
J. E. Murphy, Clockville; second prize, $2.
James E. Rice, Yorktown; third prize, $1.

Five Varieties Melons, Musk.

A. Babcock, North Syracuse; first prize, $4.
Glendale Farm, Glens Falls; second prize, $2.
J. C. Howard, Rochester; third prize, $1.

Five Varieties Melons, Water.

A. Babcock, North Syracuse; first prize, $4.
Glendale Farm, Glens Falls; second prize, $2.

Five Varieties Early Potatoes.

Francis Peck, Albury, Ont.; first prize, $4.
C. E. Chapman, Peruville; second prize, $2.
O. M. Lincoln, Newark; third prize, $1.

Five Varieties Late Potatoes.

A. Donald, Elmira; first prize, $4.
Charles Swaffer, East Onondaga; second prize, $2.
C. E. Chapman, Peruville; third prize, $1.

Five Varieties Squashes, Winter.

Glendale Farm, Glens Falls; first prize, $4.
E. Van Allen, Delmar; second prize, $2.
S. Bockens, Baldwinsville; third prize, $1.

Five Varieties Squashes, Summer.

E. Van Allen, Delmar; first prize, $4.
W. H. Pillow, Reed's Corners; second prize, $2.

Ten Varieties Garden Beans, in Pods.

E. Van Allen, Delmar; first prize, $4.
J. E. Murphy, Clockville; second prize, $2.
R. N. Lewis, Red Hook; third prize, $1.

Six Garden Beets, Round.

W. H. Heustis, Belmont, Mass.; first prize, $3.
C. Coolidge, Phelps; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Six Garden Beets, Long.

J. E. Murphy, Clockville; first prize, $3.
W. H. Pillow, Reed's Corners; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Two Quarts Lima Beans, Pod.

Lyman James, Onondaga Valley; first prize, $3.
J. C. Howard, Rochester; second prize, $1.
Charles Swaffer, East Onondaga; third prize, 50 cents.

Six Stalks Celery.

J. C. Howard, Rochester; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
Mrs. George Dumas, Fulton; third prize, 50 cents.

Six White Cabbages.

Charles Swaffer, East Onondaga; first prize, $3.
W. A. Shafer, Oneonta; second prize, $1.
J. C. Howard, Rochester; third prize, 50 cents.

Six Red Cabbages.

Glendale Farm, Glens Falls; first prize, $3.
J. E. Murphy, Clockville; second prize, $1.
W. Robert Dunlop, Fayetteville; third prize, 50 cents.

Three Largest Cabbages.

Glendale Farm, Glens Falls; first prize, $3.
J. E. Murphy, Clockville; second prize, $1.
Charles Swaffer, East Onondaga; third prize, 50 cents.

Six Cauliflowers.

W. A. Shafer, Oneonta; first prize, $3.
J. C. Howard, Rochester; second prize, $1.
Julia M. Strong, Onondaga; third prize, 50 cents.

Six Orange Carrots, Long.

J. E. Murphy, Clockville; first prize, $3.
W. H. Pillow, Reed's Corners; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Six Orange Carrots, Short.

J. C. Howard, Rochester; first prize, $3.
W. A. Shafer, Oneonta; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Six White Carrots, Long.

Glendale Farm, Glens Falls; first prize, $3.
J. E. Murphy, Clockville; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Six White Carrots, Short.

A. Donald, Elmira; first prize, $3.
R. N. Lewis, Red Hook; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Six White Cucumbers.

Charles Swaffer, East Onondaga; first prize, $3.
R. N. Lewis, Red Hook; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Six Yellow Cucumbers.

Julia M. Strong, Onondaga; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
C. Coolidge, Phelps; third prize, 50 cents.

Six Purple Egg Plants.

Charles Swaffer, East Onondaga; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
J. C. Howard, Rochester; third prize, 50 cents.

Six Heads Endive.

E. Van Allen, Delmar; first prize, $3.
J. C. Howard, Rochester; second prize, $1.
Charles Swaffer, East Onondaga; third prize, 50 cents.

Three Heads Siberian Kale.

W. H. Pillow, Reed's Corners; first prize, $3.
C. Coolidge, Phelps; second prize, $1.

Three Heads Scotch Kale.

Charles Swaffer, East Onondaga; first prize, $3.
W. H. Pillow, Reed's Corners; second prize, $1.
Julia M. Strong, Onondaga; third prize, 50 cents.

Four Quarts Garlic.

S. Brockens, Baldwinsville; first prize, $3.
A. Donald, Elmira; second prize, $1.
Julia M. Strong, Onondaga; third prize, 50 cents.

Six Kohl-rabi, Red.

J. E. Murphy, Clockville; first prize, $3.
O. M. Lincoln, Newark; second prize, $1.
Mrs. Geo. Dumas, Fulton; third prize, 50 cents.

Six Kohl-rabi, White.

J. E. Murphy, Clockville; first prize, $3.
W. H. Pillow, Reed's Corners; second prize, $1.
J. C. Howard, Rochester; third prize, 50 cents.

Six Heads Lettuce.

Charles Swaffer, East Onondaga; first prize, $3.
E. Van Allen, Delmar; second prize, $1.

Six Nutmeg Muskmelons.

Charles Swaffer, East Onondaga; first prize, $3.
A. Babcock, North Syracuse; second prize, $1.
Mrs. Geo. Dumas, Fulton; third prize, 50 cents.

Six Cantaloupe Melons.

J. C. Howard, Rochester; first prize, $3.
A. Babcock, North Syracuse; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Three Citron Melons.

E. Van Allen, Delmar; first prize, $3.
Glendale Farm, Glens Falls; second prize, $1.
C. Coolidge, Phelps; third prize, 50 cents.

Three Watermelons.

Glendale Farm, Glens Falls; first prize, $3.
H. A. Lamphere, Weedsport; second prize, $1.
A. Babcock, North Syracuse; third prize, 50 cents.

Six Globe Mangolds.

A. Donald, Elmira; first prize, $3.
W. H. Pillow, Reed's Corners; second prize, $1.
Glendale Farm, Glens Falls; third prize, 50 cents.

Six Long Red Mangolds.

R. N. Lewis, Red Hook; first prize, $3.
Glendale Farm, Glens Falls; second prize, $1.
J. E. Murphy, Clockville; third prize, 50 cents.

Twelve Red Onions.

J. C. Howard, Rochester; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
Smith & Powell Co., Syracuse; third prize, 50 cents.

Twelve Yellow Onions.

Glendale Farm, Glens Falls; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
Charles Swaffer, East Onondaga; third prize, 50 cents.

Twelve White Onions.

Glendale Farm, Glens Falls; first prize, $3.
J. C. Howard, Rochester; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Twelve Largest Peppers.

E. Van Allen, Delmar; first prize, $3.
J. C. Howard, Rochester; second prize, $1.
Glendale Farm, Glens Falls; third prize, 50 cents.

Six Heads Parsley.

W. H. Pillow, Reed's Corners; first prize, $3.
Lyman James, Onondaga Valley; second prize, $1.
Julia M. Strong, Onondaga; third prize, 50 cents.

Three Crook-Neck Pumpkins.

Glendale Farm, Glens Falls; first prize, $3.
A. Donald, Elmira; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Three Sweet Pie Pumpkins.

M. F. Pierson, Seneca Castle; first prize, $3.
W. Robert Dunlop, Fayetteville; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Three Field Pumpkins, Red.

Glendale Farm, Glens Falls; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
C. Coolidge, Phelps; third prize, 50 cents.

Three White Burt Scallop Squashes.

A. Donald, Elmira; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
C. Coolidge, Phelps; third prize, 50 cents.

Three Hubbard Squashes.

H. A. Lamphere, Weedsport; first prize, $3.
Glendale Farm, Glens Falls; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Three Marrow Squashes.

Glendale Farm, Glens Falls; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
H. A. Lamphere, Weedsport; third prize, 50 cents.

Three Marblehead Squashes.

C. Coolidge, Phelps; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
J. C. Howard, Rochester; third prize, 50 cents.

Six White Table Turnips.

W. H. Heustis, Belmont, Mass.; first prize, $3.
J. E. Murphy, Clockville; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Best Ten Monroe Seedling Potatoes.

A. Donald, Elmira; first prize, $2.
Francis Peck, Albury, Ont.; second prize, $1.
James E. Rice, Yorktown; third prize, 50 cents.

Best Ten White Star Potatoes.

Frank A. Van Ness, Baldwinsville; first prize, $2.
Francis Peck, Albury, Ont.; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Best Ten Strange Beauty Potatoes.

O. M. Lincoln, Newark; first prize, $2.
A. Donald, Elmira; second prize, $1.
C. E. Chapman, Peruville; third prize, 50 cents.

Best Ten Early Northern Potatoes.

C. E. Chapman, Peruville; first prize, $2.
A. Donald, Elmira; second prize, $1.
J. E. Murphy, Clockville; third prize, 50 cents.

Best Ten Early Albino Potatoes.

O. M. Lincoln, Newark; first prize, $2.
C. E. Chapman, Peruville; second prize, $1.
Francis Peck, Albury, Ont.; third prize, 50 cents.

Best Ten Dandy Potatoes.

C. E. Chapman, Peruville; first prize, $2.
A. Donald, Elmira; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Best Ten Everett Potatoes.

Francis Peck, Albury, Ont.; first prize, $2.
W. H. Pillow, Reed's Corners; second prize, $1.
C. E. Chapman, Peruville; third prize, 50 cents.

Best Ten Maggie Murphy Potatoes.

Grant G. Hitchings, South Onondaga; first prize, $2
A. Donald, Elmira; second prize, $1.
C. E. Chapman, Peruville; third prize, 50 cents.

Best Ten Early Market Potatoes.

C. E. Chapman, Peruville; first prize, $2.
O. M. Lincoln, Newark; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Six Sweet Potatoes, Red.

J. E. Murphy, Clockville; first prize, $2.
R. N. Lewis, Red Hook; second prize, $1.
A. Donald, Elmira; third prize, 50 cents.

Six Golden Globe Turnips.

W. H. Pillow, Reed's Corners; first prize, $3.
J. E. Murphy, Clockville; second prize, $1.
E. Van Allen, Delmar; third prize, 50 cents.

Twelve Stalks Rhubarb.

Charles Swaffer, East Onondaga; first prize, $3.
W. H. Heustis, Belmont, Mass.; second prize, $1.
Julia M. Strong, Onondaga; third prize, 50 cents.

Twelve Root Salsify, White.

W. H. Heustis, Belmont, Mass.; first prize, $3.
Glendale Farm, Glens Falls; second prize, $1.
Charles Swaffer, East Onondaga; third prize, 50 cents.

Twelve Root Salsify, Black.

W. H. Pillow, Reed's Corners; third prize, 50 cents.

Twelve Root Okra.

E. Van Allen, Delmar; first prize, $3.
C. Coolidge, Phelps; second prize, $1.
Mrs. George Dumas, Fulton; third prize, 50 cents.

Twelve Leeks.

J. E. Murphy, Clockville; first prize, $3.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Twelve Martynia.

A. Donald, Elmira; first prize, $3.
Glendale Farm, Glens Falls; second prize, $1.
Mrs. George Dumas, Fulton; third prize, 50 cents.

Three Brussels Sprouts.

W. H. Pillow, Reed's Corners; first prize, $3.
E. Van Allen, Delmar; second prize, $1.
C. Coolidge, Phelps; third prize, 50 cents.

Three Swiss Chard.

R. N. Lewis, Red Hook; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Six Sugar Beets.

W. H. Pillow, Reed's Corners; first prize, $1.
C. Coolidge, Phelps; second prize, 50 cents.

Largest Pumpkin.

E. Van Allen, Delmar; first prize, $1.
Glendale Farm, Glens Falls; second prize, 50 cents.

Largest Squash.

C. Coolidge, Phelps; first prize, $1.
J. C. Howard, Rochester; second prize, 50 cents.

Largest Muskmelon.

A. Babcock, North Syracuse; first prize, $1.
J. C. Howard, Rochester; second prize, 50 cents.

Largest Watermelon.

H. A. Lamphere, Weedsport; first prize, $1.
Glendale Farm, Glens Falls; second prize, 50 cents.

Largest Mangold.

R. N. Lewis, Red Hook; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Largest Cabbage.

Glendale Farm, Glens Falls, first prize, $1.
Charles Swaffer, East Onondaga; second prize, 50 cents.

Three Largest Potatoes.

M. Smith, Baldwinsville; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Three Largest Turnips.

E. Van Allen, Delmar; first prize, $1.
O. M. Lincoln, Newark; second prize, 50 cents.

Three Largest Rutabagas.

Glendale Farm, Glens Falls; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Three Largest Carrots.

A. Donald, Elmira; first prize, $1.
W. H. Pillow, Reed's Corners; second prize, 50 cents.

Three Largest Garden Beets.

J. E. Murphy, Clockville; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Three Largest Tomatoes.

Julia M. Strong, Onondaga; first prize, $1.
J. C. Howard, Rochester; second prize, 50 cents.

Three Largest Kohl-rabi.

Glendale Farm, Glens Falls; first prize, $1.
E. Van Allen, Delmar; second prize, 50 cents.

Three Largest Cucumbers.

J. C. Howard, Rochester; first prize, $1.

Twelve Root Salsify, Black.

W. H. Pillow, Reed's Corners; third prize, 50 cents.

Twelve Root Okra.

E. Van Allen, Delmar; first prize, $3.
C. Coolidge, Phelps; second prize, $1.
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Glendale Farm, Glens Falls; second prize, 50 cents.

Largest Squash.

C. Coolidge, Phelps; first prize, $1.
J. C. Howard, Rochester; second prize, 50 cents.

Largest Muskmelon.

A. Babcock, North Syracuse; first prize, $1.
J. C. Howard, Rochester; second prize, 50 cents.

Largest Watermelon.

H. A. Lamphere, Weedsport; first prize, $1.
Glendale Farm, Glens Falls; second prize, 50 cents.

Largest Mangold.

R. N. Lewis, Red Hook; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Largest Cabbage.

Glendale Farm, Glens Falls, first prize, $1.
Charles Swaffer, East Onondaga; second prize, 50 cents.

Three Largest Potatoes.

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A. Donald, Elmira; second prize, 50 cents.

Three Largest Turnips.

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O. M. Lincoln, Newark; second prize, 50 cents.

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Glendale Farm, Glens Falls; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Three Largest Carrots.

A. Donald, Elmira; first prize, $1.
W. H. Pillow, Reed's Corners; second prize, 50 cents.

Three Largest Garden Beets.

J. E. Murphy, Clockville; first prize, $1.
A. Donald, Elmira; second prize, 50 cents.

Three Largest Tomatoes.

Julia M. Strong, Onondaga; first prize, $1.
J. C. Howard, Rochester; second prize, 50 cents.

Three Largest Kohl-rabi.

Glendale Farm, Glens Falls; first prize, $1.
E. Van Allen, Delmar; second prize, 50 cents.

Three Largest Cucumbers.

J. C. Howard, Rochester; first prize, $1.

Three Largest Celery.

J. C. Howard, Rochester; first prize, $1.
Mrs. Geo. Dumas, Fulton; second prize, 50 cents.

Three Largest Radishes.

Glendale Farm, Glens Falls; first prize, $1.
E. Van Allen, Delmar; second prize, 50 cents.

Three Largest Onions.

Glendale Farm, Glens Falls; first prize, $1.
W. A. Shafer, Oneonta; second prize, 50 cents.

Best Collection of Vegetables, Grown by Exhibitor.

J. C. Howard, Rochester; first prize, $50.
E. Van Allen, Delmar; second prize, $25.
J. E. Murphy, Clockville; third prize, $12.50.

SPECIAL PRIZE.

W. Atlee Burpee & Co. of Philadelphia, Pa., offered special prizes for best collection of vegetables grown from Burpee's seeds.
E. Van Allen, Delmar; first prize, $20.
J. E. Murphy, Clockville, second prize, $10.

BEES AND HONEY.

Best Italian Bees, with Queen, in Single-Comb Observatory Hive.

J. F. House, Camillus; first prize, $6.
J. W. Pierson, Union Springs; second prize, $4.
C. L. Parker, Onondaga; third prize, $2.

Best Carniolan Bees, with Queen, in Single-Comb Observatory Hive.

C. L. Parker, Onondaga; first prize, $6.
Mary E. Mills, Fairmount; second prize, $4.
J. F. House, Camillus; third prize, $2.

Best Black Bees, with Queen, in Single-Comb Observatory Hive.

J. W. Pierson, Union Springs; first prize, $6.
B. R. Knapp, Cortland; second prize, $4.
T. C. Stanton, Rochester; third prize, $2.

Best and Most Attractive Display of Comb Honey, Basswood or Clover, 250 Pounds, no More or Less.

E. H. Perry, South Bristol; first prize, $6.
J. W. Pierson, Union Springs; second prize, $4.
Mary E. Mills, Fairmount; third prize, $3.

Best Liquid Extracted Honey, Basswood or Clover, Fifty Pounds, in Glass.

Mary E. Mills, Fairmount; first prize, $6.
J. F. House, Camillus; second prize, $4.
J. W. Pierson, Union Springs; third prize, $3.

Best and Most Attractive Display of Basswood or Clover Extracted Honey, Both Liquid and Candied, 250 Pounds, in Glass.

Mary E. Mills, Fairmount; first prize, $15.
C. L. Parker, Onondaga; second prize, $8.

Best and Most Attractive Display of Buckwheat Extracted Honey, Both Liquid and Candied, 250 Pounds, in Glass.

J. F. House, Camillus; first prize, $10.
C. L. Parker, Onondaga; second prize, $6.

Most Attractive Display of Beeswax, Twenty-five Pounds or Over.

J. F. House, Camillus; first prize, $10.
J. W. Pierson, Union Springs; second prize, $5.
C. L. Parker, Onondaga; third prize, $3.

Best Exhibit Apiarian Implements and Supplies Manufactured by the Exhibitor.

T. C. Stanton, Rochester; third prize, $5.

DAIRY.

No butter awarded a prize unless it scored above 94 points.

Butter showing marks of tryer not allowed to compete for prizes.

No marks or brands on the packages or cases to indicate the manufacturer.

Only one prize given the same exhibitor in any one class for butter.

Score for judging butter:

Flavor	45
Grain	25
Color	15
Salting	10
Packing	5
	100

In awarding prizes on butter and cheese, the method of determining the amount to be awarded each exhibitor was as follows:

The number of points scored by each exhibit, above 94, was added together, and the whole amount of money set apart for prizes in that class divided by this sum, which determined the unit value of each point.

Then multiplying this unit of value by the number of points above 94, scored by each exhibit, showed the amount of prize to which the exhibitor was entitled.

Score for judging cheese in export class:

Flavor	45
Texture and body	30
Color	15
Finish	10
	100

Score for judging cheese in home-trade class:

Flavor	50
Texture and body	25
Color	15
Finish	10
	100

BUTTER.

One Package of Not Less Than Forty Pounds, Made at Any Time in a Co-operative Creamery.

NAME.	Residence.	Flavor.	Grain.	Color.	Salting.	Packing.	Total.	Amount.
Clyde Creamery Co.	Clyde	43	23	15	8½	5	94½	$1 50
Abram Reynolds	Brainardsville	43½	24	15	9	5	96½	7 50
Charles H. Chase	Brainardsville	43½	24	15	9	4½	96	6 00
W. E. Hitchcock	Savannah	44	24	15	9	5	97	9 00
F. G. Barnaskey	Delanson	44	24	15	8½	5	96½	7 50
Clarence Shulters	Clark	44	24	15	8½	5	96½	7 50
Elk Creamery Co.	Scandia. Pa	44½	24½	15	8	5	97	9 00
G S. Cowles	Open Meadow	43½	24	15	9	5	96½	7 50
Thos. G. Rutherford	Chipman	43½	24	15	8½	5	96	6 00
F. H. Aldrich	Jamestown	44	24	15	8	5	96	6 00
B Rhinehart	Jamestown	44	24	15	9	4½	96½	7 50
F X Baumert & Co.	Antwerp	44	23½	15	9	5	96½	7 50
R. K. Houghnot	Kiantone	44½	24½	15	9	5	98	12 00
C. N. Taylor	Ivory	44½	24½	15	8	5	97	9 00
Fisher Bros	Madrid	43½	23½	15	8½	5	95½	4 50
James Beswick	Morley	43	24	15	8½	4½	95	3 00
Lewis Shannon & Co.	Potsdam	43½	24	15	8½	5	96	6 00
J W. Gates	Chittenango	44	22½	15	9	5	95½	4 50
C. F Brunson	Moons	44	24½	14½	9½	5	97½	10 50
E. C. Straight	Cassadaga	44½	24½	15	8½	5	9 ½	10 50
M. A. Huntley	Fowler	44	23½	15	9	5	96½	7 50

One Package of Not Less Than Five Pounds, Made at Any Time in a Private Dairy.

F. G. Davis	Mohawk	43	24½	13½	9½	5	95½	9 72
J. Newton Mills	Cato	42	24	15	9	5	95	6 48
Martha J Winsor	Hartwick	42	24	15	9	5	95	6 48
Chas M Howe	Braman Corners	43	24½	15	8	5	95½	9 72
W McKer ow	Middleville	43	25	15	9	5	97	19 44
Mrs F G Barnaskey	Delanson	42	24	15	8½	5	94½	3 24
Frank A Van Ness	Baldwinsville	43	24	15	8½	4½	95	6 48
A A Knapp	Preble	44	25	15	10	5	99	32 41
Thos Hou ton	Herkimer	44	24	15	9	5	97	19 45
John A Ennis	Pattersonville	42	24	15	8½	5	94½	3 5
Geo. W. Sisson, Jr.	Potsdam	43½	24	15	9	4	95½	9 72
Nelson St Denis	Potsdam	43½	24½	14½	9½	4	96	12 96
Mrs. Maurice Temple	Lysander	43	24½	15	9½	5	97	19 45
Mrs. W H Knapp	Cortland	43	24	15	9	5	96	12 96
H. A. Lamphere	Weedsport	42	24	15	9	4½	94½	3 24

Not Less Than Ten Pounds in Prints or Molds.

Martha J. Winsor	Hartwick	4 ½	24	15	9	5	95½	6 98
Thos F Rutherford	Chipman	43½	24	15	8½	5	96	9 30
A. A. Knapp	Preble	43	25	14½	9	5	96½	11 63
D. E Boyd	Downsville	43½	24	14½	9	4	95	4 65
C E Walker	Norwood	43	23½	15	8½	5	95	4 65
Geo W Sisson, Jr.	Potsdam	44	25	15	10	5	99	23 26
Austin Leonard	Troy Pa	43	24	15	9	4½	95½	6 98
B R. Knapp	Cortland	43½	25	14½	9	5	97	13 95
Fred Fergusson	Redwood	43½	24½	15	9	5	97	13 95
E. Van Alstyne	Kinderhook	43	24	15	9	4	95	4 65

CHEESE.

One Cheese for Export (White or Colored).

NAME.	Residence.	Total score.	Amount.
C. O'Brien	Philadelphia, N. Y.	96½	$3 51
C. E. Griffin	De Peyster	97½	4 91
O. J. Folts	Ischua	99	7 02
E. G. Graves	Lowville	99	7 02
Mrs J. M. Graves	Lowville	99	7 02
J. W. Mutter	W. Monroe	94½	71
J E. Knapp	Deer River	97	4 21
B. Graves	Lowville	97½	4 91
C. Clause	Constableville	94½	71
Fred P. Baker	Camden	98	5 61
W L. Hogg	Hinsdale	98	5 61
Mather Bros	Belleville	98	5 61
W. E. Fitch	Lowville	98	5 61
W. J. Webb	E. Martinsburg	98	5 61
John E. Murphy	Montague	95½	2 11
Wesley Reed	De Peyster	97½	4 91
F. C. Gowdy	W. Martinsburg	98	5 61
C. Congdon	W. Clarksville	99½	7 72
B. M. Graves	Copenhagen	98	5 61
J H Harrison	Cherry Valley	98	5 61
S. P Lintz, Jr	E. Schuyler	96½	8 51
C. Hirschey	Beaver Falls	97½	4 91
G. Schrag	Perrysburg	99	7 02
Fred H. Loucks	Lowville	95	1 41
A. E. Gore	Pamelia	96½	3 51
F. P. Dunnaway	East Rodman	100	8 41
R. F. Dunnaway	East Rodman	97	4 21
A. E Helmer	Evans Mills	95½	2 11
C. B. Still	Theresa	95	1 41
L. B. Gibbs	North Wilna	96	2 81
Ferd Carris	Omar.	99	7 02
Levi Snell	Depauville	98½	6 31
Oscar Northrup	Depauville	97½	4 91
Rhodes Babcock	Rossie	98½	6 32
F Fergusson	Redwood	98	5 61
Hugh Kirkland	Redwood	96	2 81
Frank Dollinger	Omar	98½	6 31
Daniel Walrath	Evans Mills	97	4 21
A. W Overacker	Gouverneur	98	5 61
John Phillips	North Hammond	96	2 81
W. E. York	Harrisburg	94½	71
Mrs. W. A Wheeler	Harrisburg	96	2 81
W. H. Fitch	Lowville	98	5 61

One Cheese for Home Trade (White or Colored).

F. W. Church	Belgium	94½	59
O J. Folts	Ischua	96½	2 91
David Gordon	Herkimer	98½	5 25
H. E. Cook	Denmark	96½	2 91
E. G. Graves	Lowville	97	8 50
Mrs. J. M. Graves	Lowville	97	8 50
J. E. Knapp	Deer River	98	4 66
J. H. Searl	Lowville	96½	2 91
Charles Pierce	Lowville	96½	2 91
B. Graves	Lowville	98	4 66
Chas O. Grover	Kennedy	96	2 33
M. E. Searl	Martinsburg	99	5 83
N Keefer	Kirchnerville	98½	5 25
C. Clause	Constableville	95½	1 75
M. Helley	Constableville	96	2 33
Robert Wood	Herkimer	95½	1 75
I. J. Williams	Kennedy	99½	6 42
Morden Older	Gerry	95½	1 75
E. Skiff	Cherry Creek	99	5 83
H. Ericksers	Ellington	99	5 83
Mather Bros	Belleville	97	8 50
M. E. Fitch	Lowville	99	5 83
W. J. Webb	East Martinsburg	98½	5 25
John E Murphy	Montague	95	1 17
W. L. Hogg	Hinsdale	98	4 66
F. W. Hogg	New Hudson	96	[illegible] 33

CHEESE—Concluded.

One Cheese for Home Trade (White or Colored)—*Continued.*

NAME.	Residence.	Total score.	Amount.
F. J. Lewis	Belfast	97½	$4 08
J. A. Hogue	Belfast	96½	2 91
A. J. Reynolds	Cuba	97	3 50
C. E. Hill	Cuba	95½	1 75
John Hoag	Abbotts	100	7 00
F. C. Gowdy	West Martinsburg	96½	2 91
C. Congdon	West Clarksville	100	7 00
B. M. Graves	Copenhagen	100	7 00
S. S. Wheelock	Winfield	98	4 66
H. S. Sweetland	Villenova	97	3 50
S. P. Lintz, Jr	East Schuyler	95½	1 75
C. Hirschey	Beaver Falls	94½	59
C. Schrag	Perrysburg	99½	6 42
Wm. Flath	Philadelphia	97	3 50
F. P. Dunnaway	East Rodman	96	2 33
R. F. Dunnaway	East Rodman	97	3 50
A. E. Helmer	Evans Mills	99	5 83
Silas Butts	Watertown	99	5 83
L. B. Gibbs	North Wilna	99½	6 42
L. S. Pilkin	Loraine	96½	2 91
G. W. McMullin	East Hounsfield	94½	59
Chandler Merz	Croghan	98½	5 25
W. E. York	Harrisburg	96	2 33
J. K. Fuller	Copenhagen	97	3 50
W. H. Fitch	Lowville	97	3 50
Geo. Searl	Lowville	99	5 83

One Case Pineapple.

NAME.	Residence.	Total score.	Amount.
O. A. Weatherby	Norwich	94½	12 50

One Case Neufchatel.

NAME.	Residence.	Total score.	Amount.
F. X. Baumert & Co	Antwerp	97	6 25
F. H. Gates & Sons	Chittenango	98	8 33
Danish Dairy Co	Chittenango	99	10 42

One Case Young Americas or Small Fancy.

NAME.	Residence.	Total score.	Amount.
H. E. Cook	Denmark	98½	8 03
J. H. Searl	Lowville	96½	4 46
Charles Pierce	Lowville	95	1 79
W. S. Kyes	Ox Bow	98	7 15
C. Hungerford	Ox Bow	96	3 57

One Case Philadelphia Creams.

NAME.	Residence.	Total score.	Amount.
F. X. Baumert & Co	Antwerp	100	8 33
Danish Dairy Co	Chittenango	100	8 34
F. H. Gates & Sons	Chittenango	100	8 33

One Sage.

NAME.	Residence.	Total score.	Amount.
J. H. Searl	Lowville	96	8 70
B. Graves	Lowville	98	17 39
P. C. Parkinson	Watertown	94½	2 18
C. B. Wilson	Philadelphia	99	21 73

One Case Club.

NAME.	Residence.	Total score.	Amount.
F. E. Dawley	Fayetteville	95	25 00

ART.

OIL AND WATER COLOR PAINTINGS.

George R. Barse, Jr., New York city; first prize, $300.
C. Morgan McIlhenny, Shrub Oak; second prize, $100.
Miss Claud R. Hirst, New York city; third prize, $100.

DOMESTIC DEPARTMENT.

China Painting, Ten Odd Pieces.

Mrs. L. A. Nutting, Syracuse; first prize, $8.
Mrs. W. F. Chandler, Rochester; second prize, $4.

China Painting, Flowers.

Mrs. L. A. Nutting, Syracuse; first prize, $1.50.
Mrs. W. F. Chandler, Rochester; second prize, 75 cents.

China Painting, Fruit.

Mrs. W. F. Chandler, Rochester; first prize, $1.50.
Mrs. L. A. Nutting, Syracuse; second prize, 75 cents.

China Painting, Figure Painting.

Mrs. L. A. Nutting, Syracuse; first prize, $2.
Mrs. L. A. Nutting, Syracuse; second prize, $1.

China Painting, Plaque.

Mrs. W. F. Chandler, Rochester; first prize, $2.
Mrs. L. A. Nutting, Syracuse; second prize, $1.

China Painting, Fish Set.

Mrs. L. A. Nutting, Syracuse; first prize, $2.

China Painting, Salad Dish.

Mrs. W. F. Chandler, Rochester; first prize, $2.
Mrs. L. A. Nutting, Syracuse; second prize, $1.

China Painting, Vase.

Mrs. L. A. Nutting, Syracuse; first prize, $2.
Mrs. L. A. Nutting, Syracuse; second prize, $1.

China Painting, One-half Dozen Plates.

Mrs. W. F. Chandler, Rochester; first prize, $1.50.
Mrs. L. A. Nutting, Syracuse; second prize, 75 cents.

China Painting, One-half Dozen Cups and Saucers.

Mrs. L. A. Nutting, Syracuse; first prize, $1.50.
Mrs. L. A. Nutting, Syracuse; second prize, 75 cents.

China Painting, Platter or Chop Plate.

Mrs. W. F. Chandler, Rochester; first prize, $1.50.
Mrs. L. A. Nutting, Syracuse; second prize, 75 cents.

China Painting, Tray.

Mrs. W. F. Chandler, Rochester; first prize, $1.50.
Mrs. L. A. Nutting, Syracuse; second prize, 75 cents.

China Painting, Cracker Jar.

Mrs. L. A. Nutting, Syracuse; first prize, $1.50.

China Painting, Sugar and Cream.

Mrs. W. F. Chandler, Rochester; first prize, $1.
Mrs. L. A. Nutting, Syracuse; second prize, 50 cents.

China Painting, Bon-Bon Dish.

Mrs. W. F. Chandler, Rochester; first prize, $1.
Mrs. G. K. Betts, Syracuse; second prize, 50 cents.

China Painting, Jardiniere.

Mrs. L. A. Nutting, Syracuse; first prize, $1.50.
Mrs. L. A. Nutting, Syracuse; second prize, 75 cents.

China Painting, Specimen, not Listed.

Mrs. L. A. Nutting, Syracuse; first prize, $1.
Mrs. G. K. Betts, Syracuse; second prize, 50 cents.

Specimen, Tapestry Painting.

Mrs. Mary M. Weeks, Oneida; first prize, $4.

Specimen of Painting on Blotting Cloth.

Mrs. L. A. Nutting, Syracuse; first prize, $1.

Collection of Amateur Photographs, Taken and Developed by Exhibitor.

Miss Lizzie Goodell, Canastota; first prize, $2.

Lunch Cloth, Embroidered in Silk.

Mrs. A. L. Wheeler, Vernon; first prize, $4.
Miss May E. Woolston, Syracuse; second prize, $2.

Tea Cloth, Embroidered in Silk.

Mrs. A. L. Wheeler, Vernon; first prize, $3.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, $1.50.

Centre Piece, Embroidered in Silk.

Mrs. A. L. Wheeler, Vernon; first prize, $3.
Mrs. F. A. Carpenter, Vernon; second prize, $1.50.

Half Dozen Napkins, Embroidered in Silk.

Mrs. A. S. Gray, Laurens; second prize, $1.50.

Half Dozen Doilies, Embroidered in Silk.

Mrs. A. L. Wheeler, Vernon; first prize, $2.
Mrs. F. A. Carpenter, Vernon; second prize, $1.

Single Doily, Flower Design.

Mrs. F. A. Carpenter, Vernon; first prize, 50 cents.
Mrs. A. L. Wheeler, Vernon; second prize, 25 cents.

Single Doily, Conventional Design.

Mrs. A. S. Gray, Laurens; second prize, 25 cents.

Lady's Flannel Skirt, Embroidered in Silk.

C. E. Pinkerton, Syracuse; first prize, $2.
Mrs. A. S. Gray, Laurens; second prize, $1.

Sofa Pillow, Embroidered in Silk.

Mrs. F. A. Carpenter, Vernon; first prize, $3.
Mrs. A. L. Wheeler, Vernon; second prize, $1.50.

Table Spread, Embroidered in Silk.

Mrs. A. L. Wheeler, Vernon; first prize, $2.
Mrs. A. S. Gray, Laurens; second prize, $1.

Table Scarf, Embroidered in Silk.

Mrs. A. S. Gray, Laurens; first prize, $1.

Buffet Cover, Embroidered in Silk.

Mrs. A. S. Wheeler, Vernon; first prize, $2.
Mrs. A. S. Gray, Laurens; second prize, $1.

Tray or Carver Cloth, Embroidered in Silk.

Mrs. Oscar J. Lewis, Schodack Centre; first prize, $1.
Mrs. L. Clarey, Syracuse; second prize, 50 cents.

Specimen of Roman Embroidery.

Mrs. A. S. Gray, Laurens; first prize, $2.
H. A. Lamphere, Weedsport; second prize, $1.

Specimen of Honiton Work.

Mrs. A. S. Gray, Laurens; first prize, $2.

Specimen of Jewel Work.

Mrs. A. S. Gray, Laurens; first prize, $2.

Specimen of Delft Work.

Mrs. A. S. Gray, Laurens; first prize, $1.50.

Specimen of Bulgarian Work.

Mrs. A. S. Gray, Laurens; first prize, $1.50.

Embroidered Toilet Set.

Mrs. A. S. Gray, Laurens; first prize, $2.

Embroidered Towel.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. M. C. Mead, Laurens; second prize, 50 cents.

Embroidered Napkins, One Dozen.

Mrs. A. S. Gray, Laurens; first prize, $2.
C. E. Pinkerton, Syracuse; second prize, $1.

Embroidered Pillow Shams.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. H. A. Lamphere, Weedsport; second prize, 50 cents.

Embroidered Pillow Cases.

Mrs. A. S. Gray, Laurens; first prize, $1.

Specimen of Embroidery from Original Design.

Mrs. A. L. Wheeler, Vernon; first prize, $3.
Mrs. N. F. Potter, Syracuse; second prize, $1.50.

Specimen of Initial Embroidery.

Mrs. Maurice Temple, Lysander; first prize, $1.
Mrs. A. S. Gray, Laurens; second prize, 50 cents.

Lunch Cloth in Drawn Work.

Mrs. L. A. Nutting, Syracuse; first prize, $3.
Mrs. M. A. Hadden, Syracuse; second prize, $1.50.

Center Piece or Tray Cloth in Drawn Work.

Mrs. A. L. Wheeler, Vernon; first prize, $2.
Mrs. M. C. Mead, Laurens; second prize, $1.

One-half Dozen Doilies in Drawn Work.

Mrs. A. S. Gray, Laurens; first prize, $2.
Mrs. M. A. Hadden, Syracuse; second prize, $1.

Handkerchief in Drawn Work.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. M. C. Mead, Laurens; second prize, 50 cents.

Two Towels in Drawn Work.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. M. A. Hadden, Syracuse; second prize, 50 cents.

Pillow Case in Drawn Work.

Mrs. A. S. Gray, Laurens; first prize, $1.

Apron in Drawn Work.

Mrs. A. S. Gray, Laurens; first prize, $1.

Specimen of Battenberg Lace, Finished Work.

Mrs. M. A. Hadden, Syracuse; first prize, $3.
Mrs. F. C. Williams, Syracuse; second prize, $1.50.

Specimen of Point Lace, Finished Work.

Mrs. F. C. Williams, Syracuse; first prize, $3.
Mrs. F. C. Williams, Syracuse; second prize, $1.50.

Exhibition of Plain Needle Work.

Mrs. H. A. Lamphere, Weedsport; first prize, $1.
Mrs. M. C. Mead, Laurens; second prize, 50 cents.

Specimen of Patching.

Mrs. Wm. G. Haviland, West Hoosick; first prize, 50 cents.

Specimen of Darning.

Mrs. Wm. G. Haviland, West Hoosick; first prize, 50 cents.
Mabel S. Van Allen, Delmar; second prize, 25 cents.

Specimen of Buttonholes, One Dozen.

Mrs. M. C. Mead, Laurens; first prize, 50 cents.
Mrs. A. S. Gray, Laurens; second prize, 25 cents.

Specimen of Plain Sewing, Finished Work, by a Girl Under Fifteen Years.

Mrs. M. C. Mead, Laurens; first prize, $1.
Mrs. Wm. G. Haviland, West Hoosick; first prize, 50 cents.

Specimen of Hemstitching, Finished Work.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. A. S. Gray, Laurens; second prize, 50 cents.

Decorated Book or Magazine Cover.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.

Lampshade.

Mrs. M. C. Mead, Laurens; first prize, $1.

Specimen of Child's Work.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.

Apron.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. C. E. Pinkerton, Syracuse; second prize, 50 cents.

Handkerchief Case or Box.

Mrs. A. L. Wheeler, Vernon; first prize, $1.
Mrs. F. A. Carpenter, second prize, 50 cents.

Cravat Case or Box.

Mrs. L. A. Nutting, Syracuse, first prize, $1.
Mrs. A. S. Gray, Laurens; second prize, 50 cents.

Photograph Holder.

Mrs. L. A. Nutting, Syracuse; first prize, $1.
Mrs. L. Clarey, Syracuse; second prize, 50 cents.

Lamp or Table Mat.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 25 cents.

Laundry Bag.

Mrs. M. C. Mead, Laurens; first prize, 50 cents.
Mrs. A. S. Gray, Laurens; second prize, 25 cents.

Head Rest.

Mrs. C. E. Pinkerton, Syracuse; first prize, $1.

Pincushion.

Mrs. A. S. Gray, Laurens; first prize, $1.
May E. Woolston, Syracuse; second prize, 50 cents.

Shopping Bag.

Mrs. M. C. Mead, Laurens; first prize, $1
Mrs. Wm. G. Haviland, West Hoosick; second prize, 50 cents.

Housewife.

Mrs. W. W. Barber, Syracuse; first prize, 50 cents.

Specimen of Darned Net.

Mrs. A. Gray, Laurens; first prize, $2.
Mrs. M. C. Mead, Laurens; second prize, $1.

Toilet Set.

Mrs. M. C. Mead, Laurens; first prize, $2.
Mrs. L. A. Nutting, Syracuse; second prize, $1.

Tidy.

Mrs. Wm. G. Haviland, West Hoosick; first prize, 50 cents.
Mrs. A. S. Gray, Laurens; second prize, 25 cents.

Hand or Work Bag.

Mrs. Wm. G Haviland, West Hoosick; second prize, 25 cents

Shoe Bag.

Mrs. Wm. G. Haviland, West Hoosick; first prize, 50 cents.
Mrs. H. A. Lamphere, Weedsport; second prize, 25 cents.

Splasher.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 25 cents.

Sofa Pillow.

Mrs. A. S. Gray, Laurens; first prize, $1.
Mrs. Maurice Temple, Lysander; second prize, 50 cents.

Knit Tidy.

Mrs. A. S. Gray, Laurens; first prize, 75 cents.
Mrs. H. A. Lamphere, Weedsport; second prize, 40 cents.

Knit Lace, Five Samples not Less than One Yard Each.

Mrs. A. S. Gray, Laurens; first prize, $1.

Knit Shawl.

Mrs. M. C. Mead, Laurens; first prize, $2.
Mrs. A. S. Gray, Laurens; second prize, $1.

Knit Cape.

Mrs. A. S. Gray, Laurens; second prize, 40 cents.

Knit Skirt.

Mrs. M. C. Mead, Laurens; first prize, $2.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $1.

Knit Slippers.

Mrs. M. C. Mead, Laurens; first prize, 50 cents.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 25 cents.

Knit Silk Mittens.

Mrs. A. S. Gray, Laurens; first prize, 75 cents.
Mrs. F. H. Dolbear, Fulton; second prize, 40 cents.

Knit Silk Stockings.

Mrs. M. C. Mead, Laurens; first prize, $1.
Mrs. A. S. Gray, Laurens; second prize, 50 cents.

Knit Woolen Stockings.

Mrs. M. C. Mead, Laurens; first prize, 75 cents.
Mrs. A. S. Gray, Laurens; second prize, 40 cents.

Knit Woolen Mittens.

Mrs. M. C. Mead, Laurens; first prize, 50 cents.
Mrs. A. S. Gray, Laurens; second prize, 25 cents.

Specimen of Fancy Knitting, by Lady Over Seventy Years.

Mrs. M. C. Mead, Laurens; first prize, $1.

Crocheted Tidy.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.
C. E. Pinkerton, Syracuse; second prize, 25 cents.

Crocheted Cape.

Mrs. Oscar J. Lewis, Schodack Centre; first prize, 50 cents.
Mrs. A. S. Gray, Laurens; second prize, 25 cents.

Crocheted Fascinator.

Mrs. A. S. Gray, Laurens; first prize, 75 cents.
Mrs. M. C. Mead, Laurens; second prize, 40 cents.

Crocheted Shawl.

Mrs. M. C. Mead, Laurens; first prize, $1.50.
Mrs. A. S. Gray, Laurens; second prize, 75 cents.

Crocheted Table Mats, One Set.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 25 cents.

Crocheted Thread Lace, Broad.

Julia M. Strong, Onondaga; first prize, 75 cents.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 40 cents.

Crocheted Edging.

Mrs. W. W. Barber, Syracuse; first prize, 50 cents.

Crocheted Woolen Lace.

Mrs. A. S. Gray, Laurens; first prize, 50 cents.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 25 cents.

Crocheted Purse.

Mrs. C. E. Pinkerton, Syracuse; first prize, 50 cents.
Mrs. H. A. Lamphere, Weedsport; second prize, 25 cents.

Infants' Socks, Knit or Crocheted.

Mrs. M. C. Mead, Laurens; first prize, 40 cents.
Mrs. C. E. Pinkerton, Syracuse; second prize, 20 cents.

Crocheted Sacque.

Mrs. M. C. Mead, Laurens; first prize, 50 cents.
Mrs. C. E. Pinkerton, Syracuse; second prize, 25 cents.

Crocheted Skirt.

Mrs. A. S. Gray, Laurens; first prize, $1.50.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, 75 cents.

Crocheted Toilet Set.

May E. Woolston, Syracuse; first prize, 50 cents.

Pieced Quilts, Cotton.

Mrs. F. H. Dolbear, Fulton; first prize, $1.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, 50 cents.

Pieced Quilts, Worsted.

Mrs. M. C. Mead, Laurens; first prize, $1.
Mrs. C. E. Pinkerton, Syracuse; second prize, 50 cents.

Pieced Quilts, Silk.

Mrs. W. W. Barber, Syracuse; first prize, $2.
Mrs. A. S. Gray, Laurens; second prize, $1.

Quilted Bedspread.

Mrs. F. H. Dolbear, Fulton; first prize, $1.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, 50 cents.

Knit Bedspread.

Mrs. A. S. Gray, Laurens; first prize, $2.50.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, $1.25.

Crocheted Bedspread.

Mrs. A. S. Gray, Laurens; first prize, $2.
Mrs. M. C. Mead, Laurens; second prize, $1.

Fancy Bedspread.

Mrs. Mary H. Miller, Syracuse; first prize, $1.
Mrs. A. S. Gray, Laurens; second prize, 50 cents.

Crocheted Afghan.

Mrs. A. S. Gray, Laurens; first prize, $2.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, $1.

Knit Afghan.

Mrs. A. S. Gray, Laurens; first prize, $3.
Mrs. M. C. Mead, Laurens; second prize, $1.50.

Child's Afghan.

Mrs. W. W. Barber, Syracuse; first prize, $1.
Mrs. Wm. G. Haviland, West Hoosick; second prize, 50 cents.

Five or More Yards of Rag Carpet.

Mrs. F. H. Dolbear, Fulton; first prize, $1.50.
Mrs. R. A. Palmer, Syracuse; second prize, 75 cents.

Cut Worsted Rug.

Mrs. Maurice Temple, Lysander; second prize, 75 cents.

Knit Rug.

Mrs. A. S. Gray, Laurens; second prize, 40 cents.

Woven Rug.

Mrs. R. A. Palmer, Syracuse; first prize, 50 cents.
Mrs. W. H. Pillow, Reeds Corners; second prize, 25 cents.

Wheaten Bread.

Mrs. F. H. Dolbear, Fulton; first prize, $3.
Mrs. C. W. Eno, Hannibal; second prize, $2.

Wheaten Bread, Made by Girl Under Fifteen Years.

Mrs. F. H. Dolbear, Fulton; first prize, $2.
Mrs. Julia M. Strong, Onondaga; second prize, $1.

Indian Bread.

Mabel S. Van Allen, Delmar; first prize, $2.
Mrs. F. H. Dolbear, Fulton; second prize, $1.

Graham Bread.

Mrs. J. Braumgart, Syracuse; first prize, $3.
Mabel S. Van Allen, Delmar; second prize, $2.

Tin of Raised Biscuit.

Mrs. F. H. Dolbear, Fulton; first prize, $3.
Mrs. J. Braumgart, Syracuse; second prize, $2.

Tin of Rolls.

Mrs. L. A. Nutting, Syracuse; first prize, $3.
Mrs. J. Braumgart, Syracuse; second price, $2.

Tin of Buns.

Mrs. J. Braumgart, Syracuse; first prize, $3.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $2.

Six Sugar Cookies.

Mabel S. Van Allen, Delmar; first prize, $2.
Russie G. King, Lafayette; second prize, $1.

Six Molasses Cookies.

Mrs. F. H. Dolbear, Fulton; first prize, $2.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $1.

Six Doughnuts.

Mrs. C. E. Pinkerton, Syracuse; first prize, $2.
Mrs. C. C. Lyon, Syracuse; second prize, $1.

Six Crullers.

Russie G. King, Lafayette; first prize, $2.

Layer Cakes, All Kinds.

Mrs. L. A. Nutting, Syracuse; first prize, $2.
Mrs. W. H. Pillow, Reed's Corners; second prize, $1.

Sponge Cake.

Mrs. H. A. Lamphere, Weedsport; first prize, $2.
Mrs. C. W. Eno, Hannibal; second prize, $1.

Angel Food.

Mrs. C. C. Lyon, Syracuse; first prize, $2.
Mrs. W. B. Goulding, Syracuse; second prize, $1.

Nut Cake.

Mrs. W. H. Pillow, Reed's Corners; first prize, $2.
Mrs. O. M. Lincoln, Newark; second prize, $1.

Fruit Cake.

Mrs. C. E. Pinkerton, Syracuse; first prize, $2.
Mrs. W. H. Pillow, Reed's Corners; second prize, $1.

Pound Cake.

Mrs. C. W. Eno, Hannibal; first prize, $2.
Mrs. W. H. Pillow, Reed's Corners; second prize, $1.

Cocoanut Cake.

Mrs. W. H. Pillow, Reed's Corners; first prize, $2.
Mrs. C. E. Pinkerton, Syracuse; second prize, $1.

Chocolate Cake.

Mrs. Wm. G. Haviland, West Hoosick; first prize, $2.
Mrs. W. H. Pillow, Reed's Corners; second prize, $1.

Sample Maple Sugar, Ten or Fifteen Pounds.

Horse Shoe Forestry Co., Horse Shoe; first prize, $3.
Mrs. M. C. Mead, Laurens; second prize, $2.

Sample Maple Syrup, One Quart Glass Can.

Horse Shoe Forestry Co., Horse Shoe; first prize, $3.
C. W. Eno, Hannibal; second prize, $2.

Half Peck Dried Apples.

Mrs. W. H. Pillow, Reed's Corners; first prize, $3.
Mrs. Maurice Temple, Lysander; second prize, $2.

Half Peck Dried Whortleberries.

Mrs. W. H. Pillow, Reed's Corners; first prize, $3.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $2.

Half Peck Dried Raspberries.

Mrs. C. W. Eno, Hannibal; first prize, $3.
Mrs. W. H. Pillow, Reed's Corners; second prize, $2.

Sample Cider Vinegar, One Quart.

T. C. Stanton, Rochester; first prize, $2.
L. L. Woodford, Berwyn; second prize, $1.

For Best Collection, not Less than Twelve Varieties of Canned Fruits.

Mrs. O. M. Lincoln, Newark; first prize, $10.
Mrs. W. H. Pillow, Reed's Corners; second prize, $5.

Best Sample of Sweet Cherries.

Mabel S. Van Allen, Delmar; first prize, $2.
Mrs. M. E. Harden, Syracuse; second prize, $1.

Best Sample of Sour Cherries.

Mrs. Fred Beley, Syracuse; first prize, $2.
Mrs. Maurice Temple, Lysander; second prize, $1.

Best Sample of Bartlett Pears.

Mabel S. Van Allen, Delmar; first prize, $2.
Mrs. Julia M. Strong, Onondaga; second prize, $1.

Best Sample Any Other Variety of Pears.

Mrs. Oscar J. Lewis, Schodack Centre; first prize, $2.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $1.

Best Sample of Red Raspberries.

L. L. Woodford, Berwyn; first prize, $2.
Mrs. Charles Bechstedt, Oswego; second prize, $1.

Best Sample of Yellow Raspberries.

L. L. Woodford, Berwyn; first prize, $2.
Mrs. O. M. Lincoln, Newark; second prize, $1.

Best Sample of Black Raspberries.

L. L. Woodford, Berwyn; first prize, $2.
Mrs. Oscar J. Lewis, Schodack Centre; second prize, $1.

Best Sample of Strawberries.

Mrs. Fred Beley, Syracuse; first prize, $2.
Mrs. W. B. Goulding, Syracuse; second prize, $1.

Best Sample of Red Currants.

Mrs. H. A. Lamphere, Weedsport; first prize, $2.
Mrs. Charles Bechstedt, Oswego; second prize, $1.

Best Sample of White Currants.

Mrs. O. M. Lincoln, Newark; first prize, $2.
Mrs. H. A. Lamphere, Weedsport; second prize, $1.

Best Sample of Pineapples.

Mrs. Charles Bechstedt, Oswego; first prize, $2.
Mrs. C. E. Pinkerton, Syracuse; second prize, $1.

Best Sample Light-Colored Plums, Named.

Mrs. Oscar J. Lewis, Schodack Centre; first prize, $2.
Mrs. Charles Bechstedt, Oswego; second prize, $1.

Best Sample Dark-Colored Plums, Named.

L. L. Woodford, Berwyn; first prize, $2.
Mrs. Charles Bechstedt, Oswego; second prize, $1.

Best Sample Yellow Flesh Peaches, Named.

Mabel S. Van Allen, Delmar; first prize, $2.
Mrs. W. G. Haviland, West Hoosick; second prize, $1.

Best Sample White Flesh Peaches, Named.

Mrs. O. M. Lincoln, Newark; first prize, $2.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $1.

Best Sample Quinces.

Mrs. Charles Bechstedt, Oswego; first prize, $2.
Mrs. W. H. Pillow, Reed's Corners; second prize, $1.

Best and Largest Collection Jellies.

Mrs. Charles Bechstedt, Oswego; first prize, $8.
Mary E. Mills, Fairmount; second prize, $5.

Best Sample Apple Jelly.

Mrs. C. E. Pinkerton, Syracuse; first prize, $2.
Mary E. Mills, Fairmount; second prize, $1.

Best Sample Blackberry Jelly.

Mary E. Mills, Fairmount; first prize, $2.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $1.

Best Sample Raspberry Jelly.

Mrs. Charles Bechstedt, Oswego; first prize, $2.
Mary E. Mills, Fairmount; second prize, $1.

Best Sample Strawberry Jelly.

Mrs. Charles Bechstedt, Oswego; first prize, $2.

Best Sample Currant Jelly.

Mrs. Charles Bechstedt, Oswego; first prize, $2.
Mrs. M. E. Harden, Syracuse; second prize, $1.

Best Sample Grape Jelly.

Mrs. C. E. Pinkerton, Syracuse; first prize, $2.
Mrs. C. E. Pinkerton, Syracuse; second prize, $1.

Best Collection of Pickles.

Mabel S. Van Allen, Delmar; first prize, $8.
Julia M. Strong, Onondaga; second prize, $4.

Best Sample Cucumber Pickles.

Mrs. Wm. G. Haviland, West Hoosick; first prize, $2.
Mrs. C. E. Pinkerton, Syracuse; second prize, $1.

Best Sample Mustard Pickles.

Julia M. Strong, Onondaga; first prize, $2.
Mabel S. Van Allen, Delmar; second prize, $1.

Best Sample Sweet Pickles.

Mabel S. Van Allen, Delmar; first prize, $2.
Mrs. H. A. Lamphere, Weedsport; second prize, $1.

Best Sample Chopped Pickles.

Mabel S. Van Allen, Delmar; first prize, $2.
Mrs. O. M. Lincoln, Newark; second prize, $1.

Best Sample Catsup.

Mrs. C. E. Pinkerton, Syracuse; first prize, $2.
Mrs. W. H. Pillow, Reed's Corners; second prize, $1.

Class Work in Plain Sewing.

Solvay Sewing School, Syracuse; first prize, $4.
Solvay Sewing School, Syracuse; second prize, $2.

Class Work in Embroidery.

Solvay Sewing School, Syracuse; first prize, $4.
Solvay Sewing School, Syracuse; second prize, $2.

FLOWERS.

General Collection of Cut Flowers.

P. R. Quinlan & Co., Syracuse; first prize, $40.
Charles Bechstedt, Oswego; second prize, $25.
James Vicks' Sons, Rochester; third prize, $15.

Dahlias, Collection not Less than Twelve Varieties, Three Blooms Each.

P. R. Quinlan & Co., Syracuse; first prize, $10.
James Vicks' Sons, Rochester; second prize, $5.
Charles Bechstedt, Oswego; third prize, $3.

Roses, Largest and Best Collection.

Smiths & Powell Co., Syracuse; first prize, $10.
P. R. Quinlan & Co., Syracuse; second prize, $5.

Phlox Annual, Best Collection.

James Vicks' Sons, Rochester; first prize, $5.
Charles Bechstedt, Oswego; second prize, $3.
P. R. Quinlan & Co., Syracuse; third prize, $1.

Phlox Perennial, Best Collection.

Charles Bechstedt, Oswego; first prize, $5.
P. R. Quinlan & Co., Syracuse; second prize, $3.
James Vicks' Sons, Rochester; third prize, $2.

Verbenas, Largest and Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $6.
Charles Bechstedt, Oswego; second prize, $4.

Asters, Largest and Best Collection, not Less than Twelve Varieties, Ten Blooms of Each.

Charles Bechstedt, Oswego; first prize, $25.
James Vicks' Sons, Rochester; second prize, $20.

Celosias, Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $5.
Charles Bechstedt, Oswego; second prize, $3.

Lilies, Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $5.
Charles Bechstedt, Oswego; second prize, $2.

Stocks, Ten-Week, Best Collection.

Bannister Bros., Syracuse; first prize, $5.
P. R. Quinlan & Co., Syracuse; second prize, $3.
Charles Bechstedt, Syracuse; third prize, $1.

Gladiolus, Largest and Best Collection, not Less than Twelve Varieties, Five of Each.

P. R. Quinlan & Co., Syracuse; first prize, $25.
James Vicks' Sons, Rochester; second prize, $20.

Gladiolus, Best Twelve Named Varieties.

James Vicks' Sons, Rochester; first prize, $5.
P. R. Quinlan & Co., Syracuse; second prize, $3.

Geraniums, Largest and Best Display, Named Varieties.

P. R. Quinlan & Co., Syracuse; first prize, $5.
Charles Bechstedt, Oswego; second prize, $3.

Sweet Peas, Largest and Best Display.

Charles Bechstedt, Oswego; first prize, $7.
P. R. Quinlan & Co., Syracuse; second prize, $3.

For Best Beds of Flowers Grown on the State Fair Grounds, Outside of Buildings.

P. R. Quinlan & Co., Syracuse; first prize, $200.

POT PLANTS.

General Collection of Stove and Greenhouse Plants.

P. R. Quinlan & Co., Syracuse; first prize, $75.

Group of Palms.

P. R. Quinlan & Co., Syracuse; first prize, $50.

Group of Ferns.

P. R. Quinlan & Co., Syracuse; first prize, $50.

Fuchias, Largest and Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $10.

Cannas, Largest and Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $20.

Zonate Pelargoniums, Largest and Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $35.

Zonate Pelargoniums, Twelve Varieties.

P. R. Quinlan & Co., Syracuse; first prize, $10.

One Zonate Pelargonium Specimen.

P. R. Quinlan & Co., Syracuse; first prize, $5.

Tuberous-Rooted Begonias, Largest and Best Collection.

P. R. Quinlan & Co., Syracuse; first prize, $30.

One Tuberous-Rooted Begonia, Specimen.

P. R. Quinlan & Co., Syracuse; first prize, $5.

Collection of Begonias, Other than Above.

P. R. Quinlan & Co., Syracuse; first prize, $15.

One Specimen Stove or Greenhouse Plant.

P. R. Quinlan & Co., Syracuse; first prize, $10.

Largest and Best Collection Coleus.

P. R. Quinlan & Co., Syracuse; first prize, $15.

Best Pair Hanging Baskets.

P. R. Quinlan & Co., Syracuse; first prize, $10.

FLORAL DESIGNS.

Best Display for Funeral Purposes.

P. R. Quinlan & Co., Syracuse; first prize, $50.
Charles Bechstedt, Oswego; second prize, $30.
W. H. Workman, Oswego; third prize, $10.

Best Display, Other than Above.

P. R. Quinlan & Co., Syracuse; first prize, $20.
Charles Bechstedt, Oswego; second prize, $10.

Best Pair of Bridal Bouquets.

P. R. Quinlan & Co., Syracuse; first prize, $8.
W. H. Workman, Oswego; second prize, $3.

PROFESSIONAL GARDENERS.

General Collection of Cut Flowers.

David Campbell, Syracuse; first prize, $40.
George Ham, Syracuse; second prize, $25.

Dahlias, Collection not Less than Twelve Varieties, Three Blooms of Each.

David Campbell, Syracuse; first prize, $5.

Phlox, Best Collection.

George Ham, Syracuse; first prize, $5.
David Campbell, Syracuse; second prize, $3.

Phlox, Perennial, Best Collection.

George Ham, Syracuse; first prize, $5.
David Campbell, Syracuse; second prize, $3.

Verbenas, Largest and Best Collection.

David Campbell, Syracuse; first prize, $6.

Asters, Largest and Best Collection, not Less than Twelve Varieties, Ten Blooms Each.

David Campbell, Syracuse; first prize, $25.
James Norris, Onondaga; second prize, $20.
George Ham, Syracuse; third prize, $10.

Celosias, Best Collection.

George Ham, Syracuse; first prize, $5.
David Campbell, Syracuse; second prize, $3.

Lilies, Best Collection.

David Campbell, Syracuse; first prize, $5.
George Ham, Syracuse; second prize, $2.

Pansies, Best Collection.

James Norris, Onondaga; first prize, $5.
David Campbell, Syracuse; second prize, $2.

Stocks, Ten-Week, Best Collection.

David Campbell, Syracuse; first prize, $3.
James Norris, Onondaga; second prize, $2.

Gladiolus, Largest and Best Collection, not Less than Twelve Varieties, Five of Each.

David Campbell, Syracuse; first prize, $15.
George Ham, Syracuse; second prize, $10.

Sweet Peas, Largest and Best Collection.

James Norris, Onondaga; first prize, $8.
George Ham, Syracuse; second prize, $5.

POT PLANTS.

Largest and Best Display of Store and Greenhouse Plants.

David Campbell, Syracuse; first prize, $60.
George Ham, Syracuse; second prize, $45.

Group of Palms.

David Campbell, Syracuse; first prize, $30.
George Ham, Syracuse; second prize, $20.

Group of Ferns.

David Campbell, Syracuse; first prize, $30.
George Ham, Syracuse; second prize, $20.

Largest and Best Collection of Fuchias.

George Ham, Syracuse; first prize, $7.
David Campbell, Syracuse; second prize, $5.

Cannas, Largest and Best Collection.

David Campbell, Syracuse; first prize, $15.
George Ham, Syracuse; second prize, $10.

Zonate Pelargoniums, Largest and Best Collection.

George Ham, Syracuse; first prize, $15.
David Campbell, Syracuse; second prize, $10.

Twelve Zonate Pelargoniums in Twelve Varieties.

George Ham, Syracuse; first prize, $8.
David Campbell, Syracuse; second prize, $5.

One Zonate Pelargonium Specimen.

George Ham, Syracuse; first prize, $5.
David Campbell, Syracuse; second prize, $2.

Tuberous-Rooted Begonias, Largest and Best Collection.

David Campbell, Syracuse; first prize, $20.
George Ham, Syracuse; second prize, $10.

One Tuberous-Rooted Begonia Specimen.

George Ham, Syracuse; first prize, $5.
David Campbell, Syracuse; second prize, $3.

Collection of Begonias, Other than Above.

David Campbell, Syracuse; first prize, $12.
George Ham, Syracuse; second prize, $8.

One Specimen Stove or Greenhouse Plant.

David Campbell, Syracuse; first prize, $10.
George Ham, Syracuse; second prize, $5.

Coleus, Largest and Best Collection.

David Campbell, Syracuse; first prize, $12.
George Ham, Syracuse; second prize, $8.

Pair Hanging Baskets.

David Campbell, Syracuse; first prize, $5.

SPECIAL PRIZE.

Offered by W. Atlee Burpee & Co. of Philadelphia, Pa., for best display of flowers grown from Burpee's seeds.

Charles Bechstedt, Oswego; first prize, $10.

AMATEURS.

General Collection of Cut Flowers.

Joseph Hullar, Syracuse; first prize, $25.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $15.
Charles Knuth, Oswego; third prize, $10.

Dahlias, Best Collection.

R. N. Lewis, Red Hook; first prize, $5.
Charles Knuth, Oswego; second prize, $3.
Mrs. Wm. G. Haviland, West Hoosick; third prize, $2.

Roses, Largest and Best Collection.

J. Brown, Onondaga; first prize, $6.
Joseph Hullar, Syracuse; second prize, $3.
Charles Knuth, Oswego; third prize, $2.

Phlox, Annual, Best Collection.

R. N. Lewis, Red Hook; first prize, $5.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $3.
Mrs. George Dumas, Fulton; third prize, $2.

Phlox, Perennial, Best Collection.

Mrs. Cassie W. Robacher, Marathon; first prize, $2.
Charles Knuth, Oswego; second prize, $1.

Verbenas, Largest and Best Collection.

R. N. Lewis, Red Hook; first prize, $5.
Mrs. Geo. Dumas, Fulton; second prize, $3.
Mrs. Wm. G. Haviland, West Hoosick; third prize, $2.

Asters, Largest and Best Collection.

R. N. Lewis, Red Hook; first prize, $5.
Charles Knuth, Oswego; second prize, $3.
C. W. Eno, Hannibal; third prize, $2.

Asters, Six Varieties, Ten Blooms of Each.

Mrs. Geo. Dumas, Fulton; first prize, $3.
C. W. Eno, Hannibal; second prize, $2.
Charles Knuth, Oswego; third prize, $1.

Celosias, Best Collection.

R. N. Lewis, Red Hook; first prize, $2.
Mrs. Geo. Dumas, Fulton; second prize, $1.

Stock, Ten-Week, Best Collection.

C. W. Eno, Hannibal; first prize, $3.
Mrs. Geo. Dumas, Fulton; second prize, $2.

Gladiolus, Largest and Best Collection.

Joseph Hullar, Syracuse; first prize, $6.
Charles Knuth, Oswego; second prize, $3.
R. N. Lewis, Red Hook; third prize, $2.

Gladiolus, Best Twelve Varieties, Three Spikes of Each.

Joseph Hullar, Syracuse; first prize, $5.
R. N. Lewis, Red Hook; second prize, $3.

Sweet Peas, Largest and Best Display.

C. C. Lyon, Syracuse; first prize, $5.
C. W. Eno, Hannibal; second prize, $3.

POT PLANTS.

Geraniums, Six Specimens in Six Varieties.

Joseph Hullar, Syracuse; first prize, $5.

Geraniums, Three Specimens.

Joseph Hullar, Syracuse; first prize, $3.

Geranium, One Specimen.

Joseph Hullar, Syracuse; first prize, $2.

Fuchsias, Four Specimens.

Joseph Hullar, Syracuse; first prize, $3.

Fuchsias, Two Specimens.

Joseph Hullar, Syracuse; first prize, $2.

Tuberous Begonias, Largest and Best Collection.

Joseph Hullar, Syracuse; first prize, $10.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $7.

Tuberous Begonia, One Specimen.

Joseph Hullar, Syracuse; first prize, $2.

Largest and Best Collection of Ferns, Native of New York State, in Pots.

Joseph Hullar, Syracuse; first prize, $7.
Mrs. Wm. G. Haviland, West Hoosick; second prize, $4.
C. W. Eno, Hannibal; third prize, $2.

FRUIT.

Professional List.

Largest and Best Collection of All Fruits Grown in State of New York, Collected and Exhibited by Any Society or Organization in the State.

Western N. Y. Hort. Society, Rochester; first prize, $200.
Eastern N. Y. Hort. Society, Chatham; second prize, $125.

Collection of not Less than Forty Varieties, Five Specimens of Each.

Ellwanger & Barry, Rochester; first prize, $20.
Wm. Palmer, Grooms; second prize, $10.
E. Van Allen, Delmar; third prize, $5.

Collection of Twenty Varieties, Five Specimens of Each.

Wm. Palmer, Grooms; first prize, $10.
Smiths & Powell & Co., Syracuse; second prize, $5.
E. Van Allen, Delmar; third prize, $3.

Collection of Ten Varieties, Five Specimens of Each.

Wm. Palmer, Grooms; first prize, $5.
E. Van Allen, Delmar; second prize, $3.
Smiths & Powell Co., Syracuse; third prize, $2.

PEARS.

Collection of not Less than Twenty-five Varieties, Five Specimens of Each.

Ellwanger & Barry, Rochester; first prize, $25.
American Nursery Co., Syracuse; second prize, $15.
Wm. Palmer, Grooms; third prize, $10.

Collection of Twenty Varieties, Five Specimens of Each.

Ellwanger & Barry, Rochester; first prize, $15.
Wm. Palmer, Grooms; second prize, $10.
American Nursery Co., Syracuse; third prize, $5.

Collection of Ten Varieties, Five Specimens of Each.

Ellwanger & Barry, Rochester; first prize, $5.
Smiths & Powell Co., Syracuse; second prize, $3.
Wm. Palmer, Grooms; third prize, $2.

PEACHES.

American Nursery Co., Syracuse; first prize, $15.

Collection of Five Varieties, Five Specimens of Each.

American Nursery Co., Syracuse; first prize, $8.

PLUMS.

Collection of not Less than Twenty Varieties, Ten Specimens of Each.

S. D. Willard, Geneva; first prize, $25.
Ellwanger & Barry, Rochester; second prize, $15.
American Nursery Co., Syracuse; third prize, $10.

Collection of not Less than Ten Varieties, Ten Specimens of Each.

S. D. Willard, Geneva; first prize, $15.
Wm. Palmer, Grooms; second prize, $10.
Ellwanger & Barry, Rochester; third prize, $5.

Collection of Five Varieties, Ten Specimens of Each.

Ellwanger & Barry, Rochester; first prize, $10.
S. D. Willard, Geneva; second prize, $5.
E. Van Allen, Delmar; third prize, $2.

QUINCES.

Dish, Ten Specimens, Orange.

Luther Collamer, Parma; first prize, $5.
M. F. Pierson, Seneca Castle; second prize $3.
S. D. Willard, Geneva; third prize, $1.

Dish, Ten Specimens, Rheas.

Ellwanger & Barry, Rochester; first prize, $5.
American Nursery Co., Syracuse; second prize, $3.

Dish, Ten Specimens, Any Other Variety.

Charles Bechstedt, Oswego; Perko Seedling; first prize, $3.
M. F. Pierson, Seneca Castle; Climax; first prize, $3.
James E. Rice, Yorktown; Champion; first prize, $3.
S. D. Willard, Geneva; Missouri Mammoth; first prize, $3.
S. D. Willard, Geneva; Santa Rosa; second prize, $2.

NATIVE GRAPES GROWN IN OPEN AIR.

Collection of not Less than Fifteen Varieties, Three Bunches of Each.

Ellwanger & Barry, Rochester; first prize, $15
Wm. Palmer, Grooms; second prize, $10.
American Nursery Co., Syracuse; third prize, $5.

Collection of Ten Varieties, Five Bunches of Each.

American Nursery Co., Syracuse; first prize, $10.

AMATEUR LIST.

APPLES.

Largest and Best Collection of Five Specimens Each.

M. F. Pierson, Seneca Castle; first prize, $30.
Francis Peck, Albury, Can.; second prize, $20.
James E. Rice, Yorktown; third prize, $10.

Collection of Twenty Varieties, Five Specimens of Each.

Luther Collamer, Parma; first prize, $15.
O. S. Jaques, Wright's Corners; second prize, $5.
J. P. Van Buren, Stockport; third prize, $3.

Collection of Ten Varieties, Five Specimens of Each.

Grant G. Hitchings, South Onondaga; first prize, $10.
J. B. Collamer & Son, Hilton; second prize, $5.
J. P. Van Buren, Stockport; third prize, $2.

PEARS.

Largest and Best Collection of Five Specimens.

David K. Bell, West Brighton; first prize, $30.
M. F. Pierson, Seneca Castle; second prize, $20.
W. H. Pillow, Reed's Corners; third prize, $10.

Collection of Twenty Varieties, Five Specimens of Each.

David K. Bell, West Brighton; first prize, $15.
W. H. Pillow, Reed's Corners; second prize, $5.

Collection of Ten Varieties, Five Specimens of Each.

David K. Bell, West Brighton; first prize, $10.
James E. Rice, Yorktown; second prize, $5.
C. H. Darrow & Co., Geneva; third prize, $2.

PEACHES.

Largest and Best Collection of Five Specimens Each.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $15.
O. M. Lincoln, Newark; second prize, $10.
M. F. Pierson, Seneca Castle; third prize, $5.

Collection of Ten Varieties, Five Specimens of Each.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $15.
O. M. Lincoln, Newark; second prize, $8.
W. H. Pillow, Reed's Corners; third prize, $4.

Collection of Five Varieties, Five Specimens of Each.

Clayton Field, Niagara-on-the Lake, Ont.; first prize, $6.
W. H. Pillow, Reed's Corners; second prize, $3.
O. M. Lincoln, Newark; third prize, $2.

PLUMS.

Largest and Best Collection, Ten Specimens of Each.

C. H. Darrow & Co., Geneva; first prize, $30.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $20.
J. B. Hadden, Pultney; third prize, $10.

Collection of Twenty Varieties.

W. H. Pillow, Reed's Corners; first prize, $20.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $8.
C. H. Darrow & Co., Geneva; third prize, $5.

Collection of Ten Varieties.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $15.
C. H. Darrow & Co., Geneva; second prize, $8.
W. H. Pillow, Reed's Corners; third prize, $5.

Collection of Five Varieties.

W. H. Pillow, Reed's Corners; first prize, $5.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $3.
C. H. Darrow & Co., Geneva; third prize, $2.

Best New Seedling Currant.

American Nursery Co., Syracuse; first prize, $5.
M. F. Pierson, Seneca Castle; second prize, $3.

NATIVE GRAPES GROWN IN OPEN AIR.

Largest and Best Collection, Correctly Named, Three Bunches of Each.

C. C. Corby, Montclair, N. J.; first prize, $30.
J. B. Hadden, Pultney; second prize, $20.
M. F. Pierson, Seneca Castle; third prize, $10.

Collection of Twenty Varieties, Three Bunches of Each.

C. C. Corby, Montclair, N. J.; first prize, $15.
Delos Tenny, Hilton; second prize, $5.
Palmer Worden, Fayetteville; third prize, $3.

Collection of Ten Varieties, Three Bunches of Each.

C. C. Corby, Montclair, N. J.; first prize, $10.
Delos Tenny, Hilton; second prize, $3.
Geo. S. Chase, Bennettsburg; third prize, $1.

FOREIGN GRAPES GROWN UNDER GLASS.

Largest and Best Collection.

Mrs. P. Barry, Rochester; first prize, $10.

SINGLE DISHES.

Apples.

American Summer Pearmain.

J. E. Murphy, Clockville; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Bailey Sweet.

Francis Peck, Albury, Can.; first prize, $1.50.

Black Gilliflower.

O. S. Jaques, Wright's Corners; first prize, $1.50.
J. P. Van Buren, Stockport; second prize, $1.
Grant G. Hitchings, South Onondaga; third prize, 50 cents.

Belle de Boskoop.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Baldwin.

James E. Rice, Yorktown; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Ben Davis.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
Francis Peck, Albury, Can.; third prize, 50 cents.

Boiken.

S. D. Willard, Geneva; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Cooper's Market.

J. P. Van Buren, Stockport; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Cox's Orange Pippin.

S. D. Willard, Geneva; first prize, $1.50.

Cranberry Pippin.

O. S. Jaques, Wright's Corners; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
Clayton Field, Niagara-on-the-Lake, Can.; third prize, 50 cents.

Chenango Strawberry.

J. B. Collamer & Son, Hilton; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
Clayton Field, Niagara-on-the-Lake, Can.; third prize, 50 cents.

Detroit Red.

Francis Peck, Albury, Can.; first prize, $1.50.

Delaware Red Winter.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Duchess of Oldenburg.

Clayton Field, Niagara-on-the-Lake, Can.; first prize, $1.50.
James E. Rice, Yorktown; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Esopus Spitzenburg.

Luther Collamer, Parma; first prize, $1.50.
O. S. Jaques, Wright's Corners; second prize, $1.
Grant G. Hitchings, South Onondaga; third prize, 50 cents.

Fallawater.

J. McDonald, Bromley; first prize, $1.50.
R. N. Lewis, Red Hook; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Fall Pippin.

J. P. Van Buren, Stockport; first prize, $1.50.
O. S. Jaques, Wright's Corners; second prize, $1.
Luther Collamer, Parma; third prize, 50 cents.

Fameuse.

O. S. Jaques, Wright's Corners; first prize, $1.50.
J. P. Van Buren, Stockport; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Garden Royal.

S. D. Willard, Geneva; first prize, $1.50.

Golden Sweet.

J. P. Van Buren, Stockport; first prize, $1.50.
L. B. Babcock, Volney; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Gravenstein.

James E. Rice, Yorktown; first prize, $1.50.
J. McDonald, Bromley; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Golden Russet.

O. S. Jaques, Wright's Corners; first prize, $1.50.
Clayton Field, Niagara-on-the- Lake, Can.; second prize, $1.
Francis Peck, Albury, Can.; third prize, 50 cents.

Hendrick's Sweet.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Hubbardston's Nonesuch.

Luther Collamer, Parma; first prize, $1.50.
James E. Rice, Yorktown; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Jonathan.

James E. Rice, Yorktown; first prize, $1.50.
E. Van Alstyne, Kinderhook; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents

King of Tompkins County.

The judge was unable to decide which was the best of the following-named exhibitors, and agreed to give each one $1 as a prize:

Grant G. Hitchings, South Onondaga.
R. N. Lewis, Red Hook.
J. P. Van Buren, Stockport.
Luther Collamer, Parma.
O. S. Jaques, Wright's Corners.
J. McDonald, Bromley.

Lady Apple.

O. S. Jaques, Wright's Corners; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
Luther Collamer, Parma; third prize, 50 cents.

Lady's Sweet.

J. B. Collamer & Son, Hilton; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Longfield.

C. H. Darrow & Co., Geneva; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Lowell.

James E. Rice, Yorktown; first prize, $1.50.
Francis Peck, Albury, Can.; second prize, $1.
W. R. Dunlop, Fayetteville; third prize, 50 cents.

Lord Nelson.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Munson Sweet.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
E. Van Alstyne, Kinderhook; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Maiden Blush.

O. S. Jaques, Wright's Corners; first prize, $1.50.
J. P. Van Buren, Stockport; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

McIntosh.

C. H. Darrow & Co., Geneva; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
Francis Peck, Albury, Can.; third prize, 50 cents.

Newtown Pippin.

J. P. Van Buren, Stockport; first prize, $1.50.
E. Van Alstyne, Kinderhook; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Norton's Melon.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Northern Spy.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
James E. Rice, Yorktown; third prize, 50 cents.

Pewaukee.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Pound Sweet.

J. McDonald, Bromley; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Porter.

J. E. Murphy, Clockville; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Red Astrachan.

L. L. Woodford, Berwyn; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
Francis Peck, Albury, Can.; third prize, 50 cents.

Red Beitigheimer.

S. D. Willard, Geneva; first prize, $1.50.
Francis Peck, Albury, Can.; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Ribston Pippin.

Luther Collamer, Parma; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Red Canada.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Rhode Island Greening.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
C. L. Parker, Onondaga; second prize, $1.
Charles Bechstedt, Oswego; third prize, 50 cents.

Roxbury Russet.

O. S. Jaques, Wright's Corners; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
Grant G. Hitchings, South Onondaga; third prize, 50 cents.

Seek No Further.

J. E. Murphy, Clockville; first prize, $1.50.
Grant G. Hitchings, South Onondaga; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Shiawassee Beauty.

O. S. Jaques, Wright's Corners; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
Clayton Field, Niagara-on-the-Lake; third prize, 50 cents.

Smith's Cider.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Stark.

C. H. Darrow & Co., Geneva; first prize, $1.50.
Francis Peck, Albury, Can.; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Scott's Winter.

M. F. Pierson, Seneca Castle; first prize, $1.50.

St. Lawrence.

J. B. Collamer & Son, Hilton; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Sops of Wine.

M. F. Pierson, Seneca Castle; first prize, $1.50.
F. E. Dawley, Fayetteville; second prize, $1.

Swaar.

O. S. Jaques, Wright's Corners; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
E. Van Alstyne, Kinderhook; third prize, 50 cents.

Stump.

J. B. Collamer & Son, Hilton; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Sutton Beauty.

M. F. Pierson, Seneca Castle; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Talman's Sweet.

J. E. Murphy, Clockville; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Twenty Ounce.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
Luther Collamer, Parma; third prize, 50 cents.

Winesap.

J. T. Roberts, Syracuse; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.

Wealthy.

Grant G. Hitchings, South Onondaga; first prize, $1.50.
Geo. S. Chase, Bennettsburg; second prize, $1.
Francis Peck, Albury, Can.; third prize, 50 cents.

Yellow Transparent.

L. L. Woodford, Berwyn; first prize, $1.50.
F. E. Dawley, Fayetteville; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Yellow Belleflower.

J. P. Van Buren, Stockport; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Can.; second prize, $1.
J. McDonald, Bromley; third prize, 50 cents.

Best Plate of Any Other Correctly Named Variety, if Deemed Worthy.

J. B. Collamer & Son, Hilton, Beauty of Kent; first prize, $1.50.
J. B. Collamer & Son, Hilton, Wagner; first prize, $1.50.
J. B. Collamer & Son, Hilton, York Pippin; first prize, $1.50.
Luther Collamer, Parma, Sweet Bough; first prize, $1.50.
O. S. Jaques, Wright's Corners, Rome Beauty; first prize, $1.50.
W. H. Pillow, Reed's Corners, Wagner; second prize, $1.
M. F. Pierson, Seneca Castle, Tufts Baldwin; second prize, $1.
James E. Rice, Yorktown, Sweet Bough; second prize, $1.
Luther Collamer, Parma, Beauty of Kent; second prize, $1.
Luther Collamer, Parma, York Pippin; second prize, $1.
Francis Peck, Albury, Can., Alexander; second prize, $1.
O. S. Jaques, Wright's Corners, Sweet Bough; third prize, 50 cents.

CRAB APPLES.

Hyslop.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Mrs. Maurice Temple, Lysander; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Marengo.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Francis Peck, Albury, Can.; second prize, $1.

Lady Elgin.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Martha.

S. D. Willard, Geneva; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Transcendent.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Francis Peck, Albury, Can.; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Best Plate of Any Other Correctly Named Variety, if Deemed Worthy.

Luther Collamer, Parma, Siberian Crab; first prize, $1.50.
M. F. Pierson, Seneca Castle, Whitney; first prize, $1.50.
M. F. Pierson, Senéca Castle, Gideon; first prize, $1.50.
M. F. Pierson, Seneca Castle, Orange; first prize, $1.50.
M. F. Pierson, Seneca Castle, Van Wyck; first prize, $1.50.
M. F. Pierson, Seneca Castle, Gen Grant; first prize, $150
M. F. Pierson, Seneca Castle, Montreal Beauty; first prize, $1.50.
M. F. Pierson, Seneca Castle, Large Red Siberian; second prize, $1.
M. F. Pierson, Seneca Castle, Quaker Beauty; second prize, $1.
Smiths & Powell Co., Syracuse, ——; second prize, $1.

PEARS.

Ansault.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.

Bartlett.

David K. Bell, West Brighton; first prize, $1.50.
J. P. Van Buren, Stockport; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Beurre Diel.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.

Buerre Easter.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.

Buerre d'Anjou.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Buerre Bosc.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.
James E. Rice, Yorktown; third prize, 50 cents.

Buerre Clairgeau.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.
James E. Rice, Yorktown; third prize, 50 cents.

Buerre Superfine.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.

Clapp's Favorite.

David K. Bell, West Brighton; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Colonel Wilder.

Ellwanger & Barry, Rochester; first prize, $1.50.

Doctor Reeder.

M. F. Pierson, Seneca Castle; second prize, $1.

Duchesse Precose.

Ellwanger & Barry, Rochester; first prize, $1.50.

Duhamel du Monceau.

Ellwanger & Barry, Rochester; first prize, $1.50.

Duchesse d'Angouleme.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.

Doyenne Boussock.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Frederick Clapp.

David K. Bell, West Brighton; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Flemish Beauty.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.
J. P. Van Buren, Stockport; third prize, 50 cents.

Howell.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Idaho.

David K. Bell, West Brighton; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Jones.

Ellwanger & Barry, Rochester; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Josephine de Malines.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.
Smiths & Powell Co., Syracuse; third 50 cents.

Kieffer.

David K. Bell, West Brighton; first prize, $1.50.
Frank A. Van Ness, Baldwinsville; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Lawrence.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
O. S. Jaques, Wright's Corners; third prize, 50 cents.

Louise Bonne d'Jersey.

Ellwanger & Barry, Rochester; first prize, $1.50.
Charles Bechstedt, Oswego; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Manning's Elizabeth.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Mount Vernon.

Ellwanger & Barry, Rochester; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Madame Trayve.

Ellwanger & Barry, Rochester; first prize, $1.50.

P. Barry.

Ellwanger & Barry, Rochester; first prize, $1.50.

Pitmaston Duchesse d'Angouleme.

David K. Bell, West Brighton; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Pres. Drouard.

S. D. Willard, Geneva; first prize, $1.50.

Pound.

Ellwanger & Barry, Rochester; first prize, $1.50.
M. F. Pierson, Seneca Castle; scond prize, $1.

Rutter.

M. F. Pierson, Seneca Castle; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Sarah.

Ellwanger & Barry, Rochester; first prize, $1.50.

Sterling.

Ellwanger & Barry, Rochester; first prize, $1.50.

Souvenir du Congres.

J. P. Van Buren, Stockport; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Seckle.

James E. Rice, Yorktown; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.
J. P. Van Buren, Stockport; third prize, 50 cents.

Sheldon.

David K. Bell, West Brighton; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Urbaniste.

Ellwanger & Barry, Rochester; first prize, $1.50.
David K. Bell, West Brighton; second prize, $1.

Vicar of Winkfield.

F. E. Dawley, Fayetteville; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Vermont Beauty.

M. F. Pierson, Seneca Castle; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
Wm. Palmer, Grooms; third prize, 50 cents.

Washington.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

White Doyenne.

O. M. Lincoln, Newark; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Winter Nelis.

David K. Bell, West Brighton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
Smiths & Powell Co., Syracuse; third prize, 50 cents.

Best Plate of Any Other Correctly Named Variety, if Deemed Worthy.

David K. Bell, West Brighton.
Ellwanger & Barry, Rochester.
Smiths & Powell Co., Syracuse.
David K. Bell, West Brighton, Columbia; first prize, $1.50.
Smiths & Powell Co., Syracuse, Webster; first prize, $1.50.
James E. Rice, Yorktown, Swan's Orange; first prize, $1.50.
M. F. Pierson, Seneca Castle, Goodall; second prize, $1.
C. L. Parker, Onondaga; second prize, $1.
W. H. Pillow, Reed's Corners, Onondaga; second prize, $1.

PEACHES.

Alexander.

O. M. Lincoln, Newark; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.

Amsden.

O. M. Lincoln, Newark; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.

Brigdon.

W. H. Pillow, Reed's Corners; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Champion.

W. H. Pillow, Reed's Corners; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Crosby.

W. H. Pillow, Reed's Corners; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Early Barnard.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
O. M. Lincoln, Newark; second prize, $1.

Early Crawford.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Early Rivers.

O. M. Lincoln, Newark; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.

Elberta.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Fitzgerald.

M. F. Pierson, Seneca Castle; first prize, $1.50.
O. M. Lincoln, Newark; second prize, $1.
Clayton Field, Niagara-on-the-Lake, Ont.; third prize, 50 cents.

Golden Drop.

M. F. Pierson, Seneca Castle; first prize, $1.50.

Hill's Chili.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Horton's Rivers.

O. M. Lincoln, Newark; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Hynes' Surprise.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
O. M. Lincoln, Newark; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Kalamazoo.

M. F. Pierson, Seneca Castle; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Late Crawford.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Lewis Seedling.

S. D. Willard, Geneva; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.

Morris White.

M. F. Pierson, Seneca Castle; first prize, $1.50.
O. M. Lincoln, Newark; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Mountain Rose.

O. M. Lincoln, Newark; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.
James E. Rice, Yorktown; third prize, 50 cents.

Old Mixon Freestone.

J. B. Collmer & Son, Hilton; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.
Luther Collamer, Parma; third prize, 50 cents.

Red Cheek Melocoton.

O. M. Lincoln, Newark; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Salway.

W. H. Pillow, Reed's Corners; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Smock.

Luther Collamer, Parma; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Stevens' Rare Ripe.

O. M. Lincoln, Newark; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
Luther Collamer, Parma; third prize, 50 cents.

Tyhurst Seedling.

M. F. Pierson, Seneca Castle; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Waterloo.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.

Wheatland.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Willet.

M. F. Pierson, Seneca Castle; first prize, $1.50.
O. M. Lincoln, Newark; second prize, $1.

Yellow St. John.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Best Plate of Any Other Correctly Named Variety, if Deemed Worthy.

Clayton Field, Niagara-on-the-Lake, Ont.; Jaques Rare Ripe; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; Reeves' Favorite; first prize, $1.50.
M. F. Pierson, Seneca Castle, Foster; first prize, $1.50.
O. M. Lincoln, Newark, Thurber; first prize, $1.50.
James E. Rice, Yorktown, Stump; first prize, $1.50.
S. D. Willard, Geneva, Willard's Seedling; first prize, $1.50.
W. H. Pillow, Reed's Corners,Foster; second prize, $1.
M. F. Pierson, Seneca Castle, Gage's Yellow Rare Ripe; second prize, $1.
O. M. Lincoln, Newark, Stump; second prize, $1.
O. M. Lincoln, Newark, Foster; third prize, 50 cents.

PLUMS.

Abundance.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.

Arch Duke.

S. D. Willard, Geneva; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.
Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
C. L. Parker, Onondaga; third prize, 50 cents.

Bradshaw.

S. D. Willard, Geneva; first prize, $1.50.
O. S. Jaques, Wright's Corners; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Burbank.

Luther Collamer, Parma; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.
J. B. Collamer & Son, Hilton; third prize, 50 cents.

Canada Orleans.

S. D. Willard, Geneva; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Coe's Golden Drop.

Geo. S. Chase, Bennettsburg; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Coe's Late Red.

S. D. Willard, Geneva; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Copper.

S. D. Willard, Geneva; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.

Diamond.

S. D. Willard, Geneva; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.

Empire.

S. D. Willard, Geneva; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Farleigh Damson.

M. F. Pierson, Seneca Castle; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Field.

S. D. Willard, Geneva; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

French Damson.

S. D. Willard, Geneva; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.

German Prune.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Luther Collamer, Parma; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Grand Duke.

S. D. Willard, Geneva; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.

Gewii.

C. L. Parker, Onondaga; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
Clayton Field, Niagara-on-the-Lake, Ont.; third prize, 50 cents.

Giant Prune.

Ellwanger & Barry, Rochester; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.

Hudson River Purple Egg.

M. F. Pierson, Seneca Castle; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.

Iskworth Imperatrice.

S. D. Willard, Geneva; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.

Imperial Gage.

M. F. Pierson, Seneca Castle; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. L. Parker, Onondaga; third prize, 50 cents.

Italian Prune.

J. B. Collamer & Son, Hilton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. H. Darrow & Co., Geneva; third prize, 50 cents.

Lombard.

C. L. Parker, Onondaga; first prize, $1.50.
Wm. G. Richards, Syracuse; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

McLaughlin.

Ellwanger & Barry, Rochester; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Middleburg.

S. D. Willard, Geneva; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.

Monarch.

S. D. Willard, Geneva; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Monroe Egg.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
O. M. Lincoln, Newark; third prize, 50 cents.

Ogon.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Peter's Yellow Gage.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Pond's Seedling.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
Wm. G. Richards, Syracuse; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Prince Engelbert.

O. S. Jaques, Wright's Corners; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
Ellwanger & Barry, Wright's Corners; third prize, 50 cents.

Prince of Wales.

S. D. Willard, Geneva; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Prunus Simoni.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
Geo. S. Chase, Bennettsburg; second prize, $1.

Quackenboss.

J. B. Collamer & Son, Hilton; first prize, $1.50.
C. H. Darrow & Co., Geneva; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Red June.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.

Reine Claude de Bavay.

J. B. Collamer & Son, Hilton; first prize, $1.50.
C. L. Parker, Onondaga; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Satsuma.

James E. Rice, Yorktown; first prize, $1.50.
J. B. Collamer & Son, Hilton; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Shropshire Damson.

C. H. Darrow & Co., Geneva; first prize, $1.50.
M. F. Pierson, Seneca Castle; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Stanton.

C. H. Darrow & Co., Geneva; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

True Sweet Botan.

Ellwanger & Barry, Rochester; first prize, $1.50.

Warner's Late Red.

C. H. Darrow & Co., Geneva; first prize, $1.50.
S. D. Willard, Geneva; second prize, $1.

Washington.

Clayton Field, Niagara-on-the-Lake, Ont.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Wixon.

S. D. Willard, Geneva; first prize, $1.50.

Yellow Egg.

Ellwanger & Barry, Rochester; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
S. D. Willard, Geneva; third prize, 50 cents.

Yellow Japan.

S. D. Willard, Geneva; first prize, $1.50.
Clayton Field, Niagara-on-the-Lake, Ont.; second prize, $1.

Best Plate of Any Other Correctly Named Variety, if Deemed Worthy.

S. D. Willard, Geneva; Norman's Jap; first prize, $1.50.
S. D. Willard, Geneva; October Purple; first prize, $1.50.
O. S. Jaques, Wright's Corners; Sharpe Emperor; first prize, $1.50.
F. E. Dawley, Fayetteville; Gen. Hand; first prize, $1.50.
O. S. Jaques, Wright's Corners; Golden Beauty; second prize, $1.
W. H. Pillow, Reed's Corners; French Prune; second prize, $1.
S. D. Willard, Geneva; Smith's Late Blue; second prize, $1.
S. D. Willard, Geneva; Late Transparent; third prize, 50 cents.
S. D. Willard, Geneva; Collingwood Damson; third prize, 50 cents.
S. D. Willard, Geneva; Frogmore Damson; third prize, 50 cents.

GRAPES.

Amber Queen.

C. C. Corby, Montclair, N. J.; first prize, $1.50.

Agawam.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Barry.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Brighton.

Delos Tenny, Hilton; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Champion.

Delos Tenny, Hilton; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Clinton.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Delos Tenny, Hilton; third prize, 50 cents.

Concord.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Catawba.

Delos Tenny, Hilton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. C. Corby, Montclair, N. J.; third prize, 50 cents.

Delaware.

Delos Tenny, Hilton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. C. Corby, Montclair, N. J.; third prize, 50 cents.

Duchesse.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
Delos Tenny, Hilton; third prize, 50 cents.

Diamond.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Early Ohio.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Early Victor.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Eldorado.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
M. F. Pierson, Seneca Castle; third prize, 50 cents.

Empire State.

Ellwanger & Barry, Rochester; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
C. C. Corby, Montclair, N. J.; third prize, 50 cents.

Eumelan.

Palmer Worden, Fayetteville; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Eaton.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, $1.

Goethe.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Goetner.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Hartford Prolific.

Delos Tenny, Hilton; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. C. Corby, Montclair, N. J.; third prize, 50 cents.

Herbert.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Ives.

C. C. Corby, Montclair, N. J.; first prize, $1.50.

Jefferson.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Lady.

Ellwanger & Barry, Rochester; first prize, $1.50.
J. B. Hadden, Pultney; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Lindley.

Delos Tenny, Hilton; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Martha.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Delos Tenny, Hilton; third prize, 50 cents.

Massasoit.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Merrimack.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Mills.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.

Moore's Early.

Ellwanger & Barry, Rochester; first prize, $1.50.
Francis Peck, Albury, Can.; second prize, $1.
C. C. Corby, Montclair, N. J.; third prize, 50 cents.

Niagara.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
C. L. Parker, Onondaga; third prize, 50 cents.

Poughkeepsie Red.

Palmer Worden, Fayetteville; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
W. H. Pillow, Reed's Corners; third prize, 50 cents.

Pocklington.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Ellwanger & Barry, Rochester; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Rebecca.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Palmer Worden, Fayetteville; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Rochester.

Ellwanger & Barry, Rochester; first prize, $1.50.

Salem.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Palmer Worden, Fayetteville; second prize, $1.
Ellwanger & Barry, Rochester, third prize, 50 cents.

Senasqua.

Ellwanger & Barry, Rochester; first prize, $1.50.

Ulster Prolific.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Vergennes.

Delos Tenny, Hilton; first prize, $1.50.
W. H. Pillow, Reed's Corners; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Winchell.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Delos Tenny, Hilton; third prize, 50 cents.

Woodruff Red.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Palmer Worden, Fayetteville; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Wyoming Red.

Ellwanger & Barry, Rochester; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Geo. S. Chase, Bennettsburg; third prize, 50 cents.

Worden.

Delos Tenny, Hilton; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.
Palmer Worden, Fayetteville; third prize, 50 cents.

Wilder.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
Delos Tenny, Hilton; second prize, $1.
Ellwanger & Barry, Rochester; third prize, 50 cents.

Best Plate of Any Other Correctly Named Variety, if Deemed Worthy.

W. H. Pillow, Reed's Corners, Geneva; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Cottage; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Campbell's Early; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Downing; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Amenia; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Dr. Colyer; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Naomi; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Lady Washington; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Essex; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Rog 34; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Rog 33; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Highland; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Telegraph; first prize, $1.50.
C. C. Corby, Montclair, N. J.; Diana; first prize, $1.50.
Palmer Worden, Fayetteville, Iona; first prize, $1.50.
American Nursery Co., Syracuse, ———; first prize, $1.50.
J. B. Hadden, Pultney, Prentice; second prize, $1.
J. B. Hadden, Pultney, Diana; second prize, $1.
M. F. Pierson, Seneca Castle, Geneva; second prize, $1.
C. C. Corby, Montclair, N. J., Brilliant; second prize, $1.
C. C. Corby, Montclair, N. J.; Rog. 32; second prize, $1.
C. C. Corby, Montclair, N. J., Waverly; second prize, $1.
C. C. Corby, Montclair, N. J., Iona; second prize, $1.
C. C. Corby, Montclair, N. J., Romella; second prize, $1.
C. C. Corby, Montclair, N. J., Geneva; third prize, 50 cents.
W. R. Dunlop, Fayetteville, Diana; third prize, 50 cents.
M. F. Pierson, Seneca Castle, Campbell's Early; third prize, 50 cents.

Best New Hybrid Not Before Exhibited.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
American Nursery Co., Syracuse; second prize, $1.

Best New Seedling Not Before Exhibited.

C. C. Corby, Montclair, N. J.; first prize, $1.50.
C. C. Corby, Montclair, N. J.; second prize, $1.

STATE FAIR COMMISSION.

HON. TIMOTHY L. WOODRUFF	Brooklyn
HON. CHARLES A. WIETING	Cobleskill
FREDERICK C. STEVENS	Attica
HARRY HAMLIN	Buffalo
C. H. HALCOMB	Syracuse
ELLIOT B. NORRIS	Sodus
SAMUEL D. WILLARD	Geneva
GEORGE I. WILBER	Oneonta
GEORGE A. SMITH	Frankfort
J. H. DURKEE	Sandy Hill
FRANK D. WARD	Batavia

OFFICERS FOR 1900.

President.

TIMOTHY L. WOODRUFF	Brooklyn

Vice-President.

CHARLES A. WIETING	Cobleskill

Secretary.

S. C. SHAVER	Albany

Treasurer.

ALBERT E. BROWN	Batavia

Superintendent.

H. A. MOYER	Syracuse

Manager.

J. H. DURKEE	Sandy Hill

An Act in Relation to State Fairs.

As the State fair was taken from the State Society in the spring of 1900 and placed under control of a State Fair Commission by act of legislation, it may be of interest to publish here the law which created that commission.

CHAPTER 346.

AN ACT to amend the agricultural law, in relation to state fairs.

Became a law, April 10, 1900, with the approval of the Governor. Passed, three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Chapter three hundred and thirty-eight of the laws of eighteen hundred and ninety-three, entitled "An act in relation to agriculture, constituting articles one, two, three, four and five of chapter thirty-three of the general laws," is hereby amended by adding at the end thereof a new article to be known as article ten, and to read as follows:

ARTICLE X.

STATE FAIR.

Section 140. Property in town of Geddes, Onondaga county, New York.
141. State fair commission.
142. State fair.
143. Superintendent of state fair; assistants and employees.
144. Receipts and disbursements.
145. Expenses of commission.
146. State and local agricultural fairs not to be held at same time. Premiums for county or town agricultural association exhibits.

Section 140. Property in town of Geddes, Onondaga county.—The conveyance to the state by the New York State Agricultural Society of its property in the town of Geddes, Onondaga county, New York, by deed dated July twenty-eight, eighteen hundred and ninety-nine, and recorded in the office of the comptroller, is hereby accepted, ratified and confirmed. Such property, and any other property hereafter acquired by the state for state fair purposes shall be under the management and control of the state fair commission as hereinafter provided, and it may, from time to time, make rules and provide for the care, preservation and improvement thereof.

§ 141. State fair commission.—The state fair commission shall consist of eleven members, of whom the lieutenant-governor and the commissioner of agriculture shall ex-officio constitute two. The remaining nine members of such commission shall be appointed by the governor, one of whom shall be a member of the New York State Grange, one a member of the New York State Association of County Agricultural Societies, and one a member of the Union Association of Agricultural Societies. Of the nine members first appointed hereunder, three shall hold for a term of one year, three for a term of two years and three for a term of three years. Their successors shall each be appointed for a term of three years. In case of a vacancy in the office of the members appointed from the societies or associations above mentioned, their successors shall be appointed from the same societies or associations.

§ 142. State fair.—It shall be the duty of the said commission to hold a state fair at such times as it may deem proper, and to publish the time of holding said fair in the month of January preceding in each year after the year nineteen hundred. Such commission may make, alter, suspend or repeal needed rules relating to such fair, including the times and duration thereof, the terms and conditions of entries and admissions, exhibits, sale of privileges, payment of premiums, and any other matters which it may deem proper in connection with such fair. It shall furnish to each person who on the seventeenth day of January, nineteen hundred, was a life member of the State Agricultural Society, a free admission to the fair ground during the fair of each year during the life of such member.

§ 143. Superintendent of state fairs; assistants and employees.—The state fair commission may appoint a superintendent of the state fair and such other assistants and employees as they may deem necessary. It may prescribe their duties and fix their compensation. Such superintendent, assistants and employees shall be subject to removal at the pleasure of such commission.

§ 144. Receipts and disbursements.—The commission shall receive all moneys payable to the state on account of said fair, and make all disbursements therefrom and also from any appropriation made for that purpose by the legislature as may be needed, from time to time, in carrying on the work of the commission. At the close of each fair, the commission shall pay to the state treasurer any balance remaining in its hands received in connection with the state fair, and at the same time deliver to the comptroller an itemized verified report showing all receipts and disbursements for state fair purposes since the last report.

§ 145. Expenses of commission.—The commission shall receive no compensation for their services, but shall be entitled to receive the actual and necessary expenses incurred by them in the performance of their duties, to be paid on the certificate of the commissioner of agriculture and the audit and warrant of the comptroller.

§ 146. State and local agricultural fairs not to be held at the same time; premiums for county and town agricultural association exhibits.—A county or other local association which holds its fair during the same week in which a state fair is held, after the year nineteen hundred, shall not be entitled to share in any appropriation or apportionment of moneys for the current year, payable under statute to county or local agricultural societies. For the best exhibits by county and town societies, one thousand dollars in premiums shall be annually awarded.

§ 2. This act shall take effect immediately.

In the annual supply bill for 1900 the following appropriations were made to carry out the provisions of the foregoing law:

Mortgage on grounds	$50,000 00
Interest on same	1,500 00
Syracuse Land Company	10,000 00
Debts of State Agricultural Society	9,807 00
Premiums at fair	22,000 00
Other expenses	33,579 00
	$126,886 00

By resolution, the State Society gave over all its effects, including a very fine agricultural library, to the State. The Society shall continue, however, to exist, certain members believing that such an old, time-honored body, with a record few organizations can boast of, should be perpetuated.

PART II.

BUREAU OF

FARMERS' INSTITUTES.

F. E. DAWLEY, DIRECTOR.

List of Farmers' Institutes for 1899.

PLACE.	County.	Date.	
Mineola	Queens	January	2–3
Georgetown	Madison		3
Camden	Oneida		3–4
Northport	Suffolk		4
Higginsville	Oneida		4
South Otselic	Chemung		4–5
Bridgehampton	Suffolk		5
Taberg	Oneida		5
Riverhead	Suffolk		6–7
Mexico	Oswego		6–7
Cincinnatus	Cortland		6–7
Cortland	Cortland		9–10
Florida	Orange		9–10
Sandy Creek	Oswego		9–10
Woodville	Jefferson		11
Monticello	Sullivan		11–12
Marathon	Cortland		11–12
Adams Centre	Jefferson		12–13
Upper Lisle	Broome		13
Walden	Orange		13–14
Belleville	Jefferson		13–14
Sodus	Wayne		16–17
LaFargeville	Jefferson		16–17
Greene	Chenango		17–18
South Onondaga	Onondaga		18–19
Hammond	St. Lawrence		18–19
Williamson	Wayne		18–19
Conklin	Broome		19
Madrid	St. Lawrence		20–21
Bainbridge	Chenango		20–21
Webster	Monroe		20–21
Antwerp	Jefferson		23–24
Fayetteville	Onondaga		23–24
Spencerport	Monroe		23–24
Cooperstown	Otsego		23–24
Schenevus	Otsego		25–26
Rochester	Monroe		25–26
Gouverneur	St. Lawrence		25–26
Attica	Wyoming		27–28
Lowville	Lewis		27–28
Altamont	Albany		27–28
Cherry Valley	Otsego		30–31
Denmark	Lewis		30–31
Constableville	Lewis	February	1
Middleburg	Schoharie		1–2
Esperance	Schoharie		2
Trenton	Oneida		3
Quaker Street	Schenectady		3
Norway	Herkimer		4

FARMERS' INSTITUTES—*(Continued)*.

PLACE.	County.	Date.	
Pattersonville	Schenectady	February	4
Voorheesville	Albany		6–7
Cazenovia	Madison		6–7
Canastota	Madison		8–9
West Sand Lake	Rensselaer		8–9
Clarksville	Albany		9
Ithaca	Tompkins		10
Stuyvesant Falls	Columbia		10–11
Union Springs	Cayuga		10–11
Waterloo	Seneca		13–14
South Bethlehem	Albany		13–14
Clifton Springs	Ontario		14–15
East Greenbush	Rensselaer		14–15
Clifton Park	Saratoga		15
Caledonia	Livingston		16–17
Gansevoort	Saratoga		16–17
Fayetteville	Onondaga		17
Batavia	Genesee		17–18
Ketchum's Corners	Saratoga		18
Minaville	Montgomery		20
Arcade	Wyoming		20
Warsaw	Wyoming		21
Hagaman	Montgomery		21
Eastern N. Y. Horticultural Society	Albany		21–22
Warsaw	Wyoming		21–22
Castile	Wyoming		22
Johnstown	Fulton		22
Pike	Wyoming		23
Mayfield	Fulton		24
Glen	Montgomery		24
Franklinville	Cattaraugus		24–25
Rural Grove	Montgomery		25
Fort Plain	Montgomery		27–28
Olean	Cattaraugus		27–28
Gouverneur	St. Lawrence		28
Bellona	Yates	March	1–2
Fulton	Oswego		1–2
Cuba	Allegany		1–2
Lysander	Onondaga		3
Friendship	Allegany		3
Prattsburg	Greene		3–4
Hannibal	Oswego		4
Ira	Cayuga		6–7
Angelica	Allegany		6–7
Spring Valley	Rockland		6–7
Canaseraga	Allegany		8
Pine Bush	Orange		8–9
Auburn	Cayuga		8–9
Canisteo	Steuben		9
Seneca Falls	Seneca		9–10
Ovid	Seneca		10
Washingtonville	Orange		10–11
Rathbone	Steuben		10–11
Ovid Centre	Seneca		11
Lodi	Seneca		13
Big Flats	Chemung		13–14
Fishkill	Dutchess		13–14

FARMERS' INSTITUTES—*(Continued).*

PLACE.	County.	Date.	
North Hector	Schuyler	March	14
Millbrook	Dutchess		14–15
Alpine	Schuyler		15
Milton	Ulster		15–16
Wellsburg	Chemung		15–16
Moore's Mills	Dutchess		16
Watkins	Schuyler		16–17
Savona	Steuben		17–18
Rhinebeck	Dutchess		17–18
Tyrone	Schuyler		18
Auburn	Cayuga		19
Penn Yan	Yates		20–21
Avoca	Steuben		20–21
Hilton	Monroe		21
Cohocton	Steuben		21–22
Lyndonville	Orleans		22–23
Hall's Corners	Ontario		22–23
Livonia	Livingston		23–24
Bristol Springs	Ontario		23–24
Gasport	Niagara		24–25
Fishers	Ontario		24–25
West Henrietta	Monroe		25
Syracuse	Onondaga		25
Palmyra	Wayne		27–28
Albion	Orleans		27–28
North Manlius	Onondaga		27–28
Rochester	Monroe		29–30
Pattersonville	Schenectady	April	14
Summit	Schoharie	May	22–23
Beards Hollow	Schoharie	June	7
Barnerville	Schoharie		10
Grovernor's Corners	Schoharie		13
Reading Centre	Schuyler		13
Summit	Schoharie		22
Palmyra	Wayne		24
Rock District			27
Sharon	Schoharie		29
Rushford	Allegany	July	11
Breakabeen	Schoharie		25
East German	Chenango	August	2
Lowville	Lewis		4
Jordan	Onondaga		9
North Franklin	Delaware		9
Charlton	Saratoga		10
Pitcher	St. Lawrence		16
West Sand Lake	Rensselaer		17
Mt. Kisco	Westchester		17
Fox Ridge	Cayuga		18
Edwards Falls	St. Lawrence		18
Clarksville	Albany		18–19
Plattsburg	Clinton		23
Lyons	Wayne		23
Navarino	Onondaga		24
Tully Lake Park	Onondaga		26
North Harpersfield	Delaware	September	1
Gilboa	Schoharie		12
Lowville	Lewis	October	14

FARMERS' INSTITUTES—*(Continued).*

PLACE.	County.	Date.	
North Ridge	Niagara	October	28
Ithaca	Tompkins	November	13
Geneva	Ontario		14–15
Parish	Oswego		16
Waterloo	Seneca		16–17
Oswego	Oswego		17
Union Springs	Cayuga		17-18
Pulaski	Oswego		17–18
Woodville	Jefferson		20–21
Delhi	Delaware		20–21
Nelson	Madison		20–21
West Eaton	Madison		22–23
Rodman	Jefferson		22–23
Hobart	Delaware		23
LaFargeville	Jefferson		24
Stockbridge	Madison		25
Jefferson	Schoharie		25
Clayton	Jefferson		25
North Harpersfield	Delaware		27
Plessis	Jefferson		27
Hamilton	Madison		28
Gilboa	Schoharie		28
Gouverneur	St. Lawrence		29
Grand Gorge	Delaware		29
Sherburne	Chenango		29
Hammond	St. Lawrence	December	1–2
Halcottsville	Delaware		1–2
Syracuse	Onondaga		2
Lexington	Greene		4
Rockdale	Chenango		4
Lisbon Centre	St. Lawrence		4–5
Hensonville	Greene		5
Morris	Otsego		5–6
Rochester	Monroe		5–7
Madrid	St. Lawrence		6–7
Durham	Greene		6–7
Walton	Delaware		6–7
Bainbridge	Chenango	December	8–9
Winthrop	St. Lawrence		8–9
Breakabeen	Schoharie		8–9
Clarence Centre	Erie		8–9
South Bethlehem	Albany		9
Afton	Chenango		11–12
Collins Station	Erie		11–12
Franklin	Delaware		11–12
Nicholville	St. Lawrence		12–13
Union	Broome		12–13
Lisle	Broome		13
Cottage	Cattaraugus		13
Bombay Junction	Franklin		13
Corbettsville	Broome		13
Conklin	Broome		13
Chappaqua	Westchester		13
Batavia	Genesee		13
Ellington	Chautauqua		14
North Bangor	Franklin		14
Canandaigua	Ontario		14–15

FARMERS' INSTITUTES—*(Concluded).*

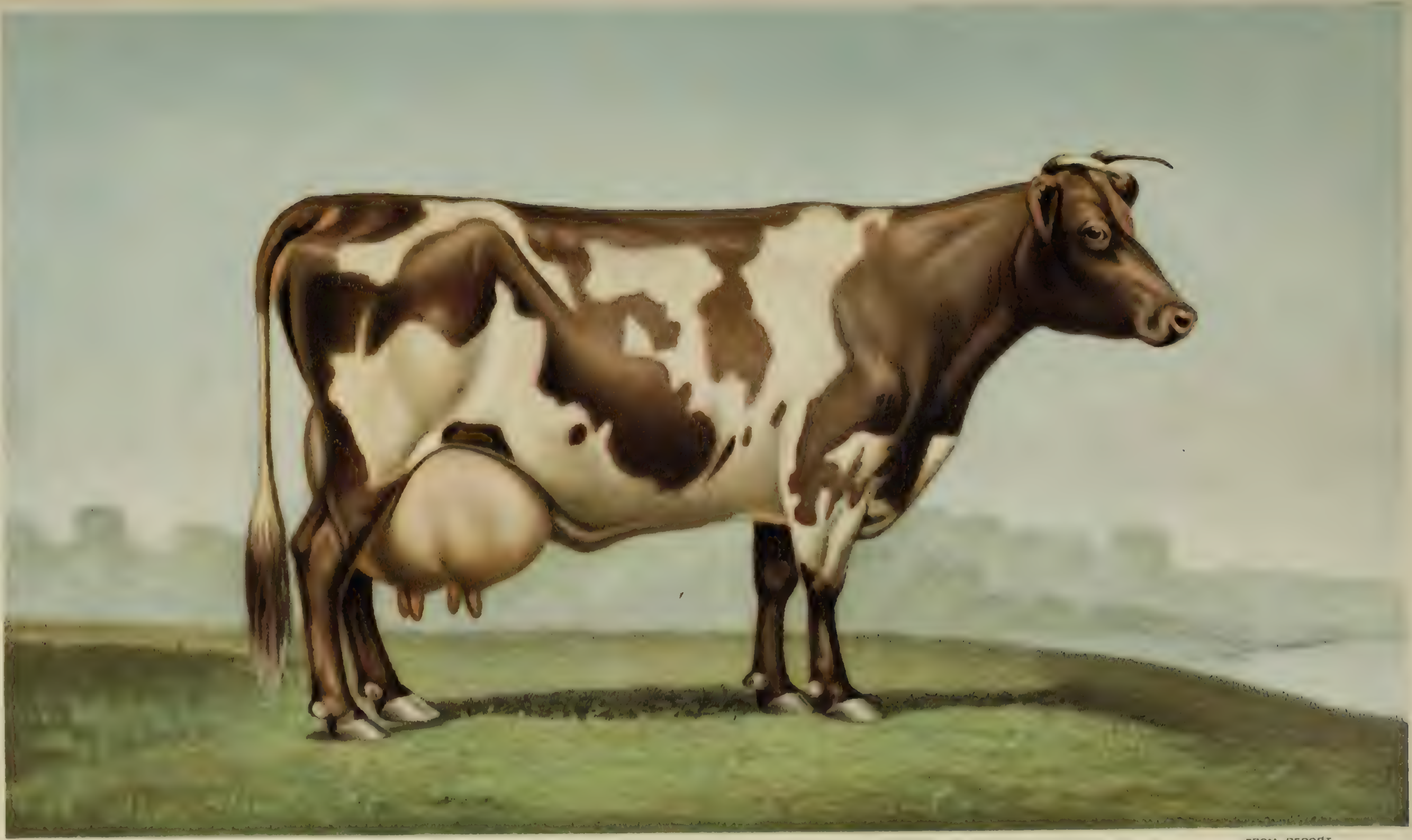
PLACE.	County.	Date.
Cortland	Cortland	December 14–15
Chateaugay	Franklin	15
Cattaraugus	Cattaraugus	15–16
Ellenburg	Clinton	16
Moore's Forks	Clinton	16
Tully	Onondaga	16
Cincinnatus	Cortland	16
Pompey Hill	Onondaga	16
South Otselic	Chenango	18
Jamestown	Chautauqua	18–19
West Chazy	Clinton	18–19
Fulton	Oswego	18–19
DeWittville	Chautauqua	19
Romulus	Seneca	19
Georgetown	Madison	19
DeRuyter	Madison	20–21
Hannibal	Oswego	20–21
Sherman	Chautauqua	20–21
Plattsburg	Clinton	20–21
Auburn	Cayuga	21
Willsboro	Essex	22
Weedsport	Cayuga	22–23
Fredonia	Chautauqua	22–23
Putnam	Washington	23
Rock District		26
Marcellus	Onondaga	26–27
Vernon	Oneida	26–27
Cuba	Allegany	27–28
Cooperstown	Otsego	27–28
Clinton	Oneida	28–29
Skaneateles	Onondaga	28–29
Chadwicks	Oneida	30
Barnerville	Schoharie	30
Mandana	Onondaga	30

Judging Cattle in the Show-Ring.

By Dr. G. M. Twitchell, Augusta, Me., at meeting of New York State Breeders' Association, held in Rochester, N. Y., Dec. 6, 1899.

Success in this world is possible only through our ideals. In proportion as the picture in the mind is clear before the artist, manufacturer or builder is it possible for energy and intelligence to be correctly and satisfactorily applied. Out of great conceptions alone come great results. Every step in the world's progress has been the outcome of large ideals in the minds of leaders. Sometimes men have stumbled on great truths, but these have been retained only as the conception of their worth and magnitude has fixed itself in the minds of intelligent leaders.

One of the most difficult things for a man to do is to break company with an old practice and establish himself in new lines of work. The tension of years holds firmly and when the thought of change comes and habits are broken, the danger is of drifting, and this is likely to carry to the opposite extreme. Men, especially those who live largely by themselves, get most firmly grounded in their practices and find it very difficult to see the merit of what is clear and open to others. Go back to the first report of this association and note to what a degree the leaders of that day outlined what we are to-day urging, how from that time to the present the one thought of progress, along the lines of present demands, has been the objective point towards which they have sought to urge the people. Ever the truth has been the same, though year by year there has come better and still better appreciation of what that truth was, and how it could best be applied to the needs of humanity. The old time conception was sufficient unto its day and generation; the newer is demanded to-day in every field of activity. It is truth just the



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FROM REPORT
U. S. BUREAU ANIMAL INDUSTRY.

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same, but it comes in new dress, it centralizes and focuses on specific points and parts, it divides and subdivides, for the reason that as we probe into closer relation of things, we find that, in the perfection of our knowledge of parts alone can we, in any true sense, grasp the perfection of the whole.

Have we ever paused to consider, as we should, how completely man may comprehend and control the most intricate problem of commerce, of manufacture, of art and music, and also how the greater his knowledge, the deeper his researches, the more faithful his investigations, the more profound will be his appreciation of the mysteries which surround and develop his every step along the pathway of agriculture. More than this are we fully alive to the fact that as we grope, using our best knowledge, we find the way opening for greater and still greater results, results which are all the while bringing increasing blessings to the world. We stand amazed at the marvelous, which is made plain to our understanding by the delvers in the realm of nature, yet they are but putting together the fragments, but coming to a realization of the great harmony which exists throughout. They are not changing, but appreciating what is, and seeking to conform to nature's requirements, out of this knowledge building for the good of future generations. It is simply getting at the harmony of things which alone makes possible improvement.

Anything and everything which will aid in strengthening faith in the underlying verities, stimulate ambition to grow, arouse competition along lines which lead to better stock and products, educate towards an appreciation of what must be taken in its entirety in order for the man to be a man in the best sense of the term—all this is demanded in the field of active duties to-day, and will be in all the days before us. Hands are to be but willing servants of active brains The power which lifts the standard of production or rate of speed brings to the forefront added lines of beauty, and a higher degree of intelligence must have keener appreciation and a clearer ideal. Have we ever thought that it is only in our ideals we are to find safety, and no where else, whether it be in the field of the moral or mechanical. They are at the foundation of advancement. The era of muscle has been superseded by the era of brains. All the conditions of trade conspire and inspire towards a higher standard. Whatever our fancies, practices and natural inclinations, there are outward conditions ruling in all departments of commerce and manufacture which govern the farmer as well as the tradesman. The farmer is not merely a producer to-day, whatever he may have been in the past. Out of his manifold forms of improved machinery, by which he is able to increase output, he becomes a manufacturer, and the laws which govern in the realm of manufactures govern in that of agriculture.

Not alone profit out of sales, but saving in cost of manufacturing, whether it be milk, butter, wool, fruit, farm products or poultry, saving in wastes, saving in labor, both of machine and man—this is what gives success in the shop and mill, and this alone will suffice on the farm. The necessity for constant study of details, close watch on all departments, constant weeding out of the least profitable, seeking for reduction of friction in operating, is appreciated on the one hand, else there could be no successful manufacturers; it must be grasped in its fullness if there is to be satisfaction and permanence on the farm.

It is no new thought I am giving utterance to, but simply the presentation of a principle, accepted but not governing, else there would be no call for the discussion of this system of measuring values at our exhibitions.

We have reached unnatural conditions in the breeding of all classes of live stock. Functions natural in their origin have been intensified, divided, subdivided and marvelously increased through the ideals of men backed by the dominant will of an objective mind. The exalted position maintained to-day by individuals and herds is not accidental, neither is it permanent. The higher levels are secured and maintained only by persistent application of one's largest conceptions, the subjective mind yielding surely to the positive influence of the clearly defined ideal in the mind of the master. To-day I plead for this ideal, necessary as never before, in order that the forward steps taken by the seers and prophets in breeding may become the standing ground of the great mass of breeders. Altogether too large a per cent. of our animals, of all breeds, must be stamped purposeless, partly from lack of skilled breeding, but more for want of skilled breeders. The standard of every breed is to be measured by the highest level reached by any individual breeder who seeks to secure and fix the essential qualities recognized by the fancier, and those also demanded in the actual tests which determine merit. The unmistakable evidence of marked family characteristics only emphasizes the lesson of the hour.

Animal life, like clay, yields readily to the hand and eye of the skilled worker, but, as the standard rises, the plastic nature becomes more positive in its type, as it grafts on the mental conceptions of the man at the head. Gentlemen, the day has arrived when the true breeder must be reckoned an artist, for under his touch he is painting color of hair, skin and membrane, shaping form, developing beauty and perfecting symmetry, while all the time intensifying those organs which alone can insure rapid and heavy production or growth. Alongside the great painters and singers are to be placed the seers in breeding, who have founded herds and established families noted not only for breed and type characteristics, but alike for great individual worth as producers. They fill the stalls in every breeding establishment, they are multiplying on every hillside, they are adding wealth to the farm homes of the world, and, more than all, they are waiting to be led out into larger fields of service as men come into clearer appreciation of fundamental principles governing development.

Consciously, or unconsciously, we measure an article, individual or animal, at the first glance. Why we like or dislike we may not be able to state, but the impression is there, and future examinations seldom change the result. This intuitive perception may be more keen in the minds of some than others, but it is the safeguard of the world. Out of it have come the results of the present in every field. Searching for the why and how, men have been led out into larger conceptions, where ideals have taken more definite shape. All do not have intuitive perceptions in the same direction, but all do have intuitive perceptions in some direction. In judging, we always measure by our ideal. It is the only safe standard; it is what we would have if we could transform to suit our fancy. No matter what the system, whether in public or private, here is the bar of justice to which the individual animal or product is to be brought.

Granting these premises, what is their application to the topic of the hour? Just this, that the method of judging should be that which will be of greatest service to the individual owner and exhibitor in the to-morrows before him. Men may come and go but breeding is to continue, and always along the line of improvement, simply because our necessities will force us up and on in the study of animal economy and the appreciation of animal machinery. Have we come to the full standard of our ideals; if so there is no future for us, and we are but cumberers of the earth. If not, then is there a call for the bringing out in clear and unmistakable lines that ideal which we would create and establish, an ideal of form, courage, intelligence, service, and as we reach after and seek to grasp its outlines, they will still float in the upper realm of our consciousness, but the standard we shall attain to will gradually rise toward the ultimate in quantity and quality.

It is the natural tendency with men working alone to drift unconsciously into fixedness of habit. The evil attending this is recognized. Out of this condition comes the low standard of production, the large per cent. of unprofitable stock, the quantity of inferior products, the evidence of a want of appreciation of the best means and methods of marketing—which, to-day, is fully one-half the story. Out of this condition comes the opposition to books and newspapers, the feeling that agricultural colleges and experiment stations are fads and not necessities, expensive luxuries which may benefit the few but cannot be of service to the many. All this is to my mind perfectly natural, and while we can see a great advance, as we mark the milestones of the past, there is needed a getting down to simple problems and a study of parts in sole relation to the whole, and with the one thought of purpose. When in our examination we take up the evidences of temperament, there is opportunity for close observation in determining fitness for any special service. Between the nervous and phlegmatic there are many shades, and to classify so that each shall have credit calls for skill, the result of practice. Yet it is just this skill which the milk producer or dairyman must have if the weeding process so necessary is to be intelligently applied.

The pathway of human experience is strewn with wrecks where the cold phlegmatic man has attempted to fill the sphere set apart for his nervous neighbor. Large production in our dairy cows is found only in the more highly nervous organisms. If this be balanced by intelligence, then we have the profitable producer. So is it with the driving horse, the egg-producing hen, and there must be some method by which, in our annual fairs, these elements of success may be made clear to the man who has not yet entered into an appreciation of the importance of these relations. The worth of the individual will always settle the question of the worth of the herd, and to bring out the individual characteristics of each one is legitimately within the scope of the score card.

We need to fix permanently in mind the fact that form governs purpose and that there is no place in the economy of the closing days of this nineteenth century for a man or an animal which is not built for something specific. So important is it that we must graft this thought into the warp and woof of our being, if we are to stand successfully in the competition of the next twenty-five years. No one opportunity offers such advantages for getting clear and unmistakable evidence of what is demanded to-day as the annual exhibition; but to realize the most, a man must be a competitor and not an indifferent visitor, and the system of awarding premiums one which will furnish the greatest possible amount of information, not only of the strong, but especially the weak points in his animal or product. It is this and this alone which will educate, which will improve and advance. There are valuable animals in every herd. Are they the result of well-directed efforts or are they accidental products? If the latter, then by a better knowledge of parts we need come into a more complete appreciation of how these accidents came, that well-directed effort may more rapidly increase the individual value of the herd. So the scale of points and score card fit naturally into the daily work of every breeder seeking to improve. The man with the card in hand who is to award the premium may not be as much an expert as the man who holds the halter, but the responsibility is on him to put his estimate on every part in accordance with the standard of perfection, and then place his name at the bottom of the card. Few men will show favoritism in such a field. More than this, these cards are the safeguards of the expert, as they furnish the story of his work in detail. In case of errors, the remedy is easily applied and justice done to every exhibitor.

Instead of comparing animal with animal and forgetting the points of difference, as must be the case as soon as the class drops out of sight, we have here the full record to be retained for the protection alike of the society and the expert.

As we are to consider the subject with reference to competition, the object of competition must be clearly recognized. I assume that the mercenary spirit, the winning of a dollar, may properly be set one side, for if it enters it dwarfs and destroys all possibility for competition to be of service. The man whose sole purpose in exhibiting is to win honors and dollars is not a breeder, but a camp follower. His herd will retrograde inevitably, for his conception is purely selfish, and while selfishness plays no part in the development of a producing herd or animal, it always stands as a bar to progress. Competition for intelligent comparison is educative, and education lifts ideals and broadens vision. For this to be possible the association under which an exhibition is held owes to the exhibitors certain specific things:

1st. Ample room for protection of stock, and examination of same by the public.

2d. Generous advertising of individual exhibits.

3d. Permanent and ample pens for judging, with seats for interested spectators.

4th. A system of awarding prizes which will insure justice to the individual exhibitor, and at the same time furnish to him and the public the reasons leading to giving or withholding an award.

5th. An expert to award the prizes who shall be required to remain one-half day after the work is completed to meet disappointed exhibitors.

6th. A blackboard on which the sectional values shall be placed as given by the expert, where all who desire can follow the work in detail, and be led to question the decisions.

Breeders are sharp and shrewd, looking after their own interests, but they are reasonable men all the while, and if they question an item in the score, the expert, if he be worthy the place, will, by pointing out the defect, satisfy the owner or correct a mistake. The greater the publicity the less cause for criticism after awards are made.

If the object be to promote agriculture, stimulate love for better stock, and strengthen purpose to procure the same, then the show ring becomes the one great object lesson of the year, and the system of judging the educating influence. I assume that we have passed out of the old custom of appointing a committee of three, and recognize the certainty that a single judge in a class insures more satisfactory results, providing the full record of his work is secured for the exhibitors. We are discussing animals, not owners, and the awards should be so placed that the cry of favoritism cannot be raised.

Two systems of awarding premiums are before us, the comparative and the mathematical. The advantages of the former are that the work can be more rapidly performed, the ribbons placed in less time, and expenses reduced. The disadvantages are that no evidence is furnished as to the reasons for giving or withholding, that there can be nothing educative under such methods, and it is impossible to prevent the charge of favoritism.

The advantages of the scale of points and score card are not that the awards are placed more equitably, but that the full evidence is on record, part by part, a copy to be furnished the exhibitor, for each animal scored, that the study of parts thus stimulated will surely lead to a more equitable balancing of the whole, preventing the natural tendency to over or underestimate, and forcing the conviction that the value of the animal lies in the sum total of the value of the several parts indicated in physical and mental make up. The disadvantages of this system are the difficulty in making equitable mathematical calculations, determining the per cent. of value in each part, and measuring the individualism of the individual, something not easily put on paper, simply because partly intuitive.

A perfect system for awarding prizes has not yet been devised. Human intelligence has not yet compassed the whole problem, and certain inequalities must surely be noted; but when the necessity for a sharper insight into the worth of parts of the great machine is recognized, and the certainty that a study of parts, and the relation each bears to the others, is sure to stimulate the breeding of still better animals, the possibilities of the score card, both as an educator and promoter of good judgment, must, I believe, be admitted by all.

The criticism made that no two judges place the same value on parts has little weight, all the exhibitor at any exhibition can ask being that the expert preserve an equitable ratio of values in placing the awards. If another expert scores higher or lower, it is no argument against the system, it simply speaks of individual estimates. If on another occasion the figures are changed, it only confirms what has already been indicated. Criticisms of this class are captious, failing in that they belittle the educational feature of the score card while magnifying the arbitrary ruling of that method which furnishes no reason for judgment. If exhibits at our fairs are to be maintained, and the number of exhibitors increased, this question of judging by some system which will return to the individual owner full evidence of the estimate of the expert upon his individual exhibit must be perfected. Under the committee and comparative system the rights of exhibitors are altogether too much ignored, the work of judging is hurried, and would-be successful breeders become discouraged and drop out.

The exhibitors make possible your exhibitions, and they are entitled to all the evidence in every case where an expert sits in judgment. The responsibility is upon fair managers to provide not only reliable experts, but some system by which the awards may not only be placed in justice, but all the educational benefits possible secured to every exhibitor.

In the breeding of to-day utility swings to the front as the chief standard of merit. For this to be secured and perpetuated the importance of careful, painstaking, systematic breeding must be everywhere insisted upon. The standards of growth and production must be raised next year, and prepotency in transmitting desirable qualities inhere in all our blooded stock in larger degree than ever. For this to be recognized and made positive to the breeder every score card should carry the reasons of the judge for his cut on any part, and so full a description of each section that perfection will be placed above the line of present attainments. The man who can find nothing to change in an animal or product. and so gives perfection on parts, is not an idealist, has no high conception of perfection, and while for the time he may please the vanity of the breeder, his influence is sure to dwarf judgment and lower the standard of excellence. With the fact before us that the sharp competition of the future will necessitate larger output and finer quality in order to secure desired revenue, the obligation falls clearly and sharply upon the breeder to enter into closer sympathy and clearer comprehension of the intelligent machine spending itself for his blessing.

There's a wonderful degree of satisfaction and assistance to be obtained from a close study of cow and horse, hog and hen physiognomy as well as anatomy. Nothing will so rapidly bring a man into close sympathy and fellowship as when he is seeking to come into, and unto, an appreciation of the traits and trends. the thoughts and aspirations, and, more than this, hindrances which make up the forces at work in the animal constitution. We talk about being helped or hindered by our environments. but, do we stop to consider the environments of the dairy cow from which we are seeking to reap a harvest of gain, or the horse which never falters or fails of the best there is in him.

The whole line of production has become so abnormally unnatural that the man at the helm must be in touch with more of the forces at work in the bodily structure of his animals, if he would control and increase production, size, rapidity of growth, style, or speed. The measure of each is simply the measure of the man. He is to be master of all, and because of this we touch here, in this study of parts, one of the greatest problems which can confront the breeder or grower.

Perfection is and always will be before us. In this fact lies the only incentive for growth and improvement, and it is the weak, not the strong side of our animals which afford opportunity for the higher skill of man to be felt in improvement. Therefore whatever will tend to make a man more critical, more observant, more enthusiastic, more intelligent, is a help and a necessity. Each individual animal and product varies in some point or part peculiar to itself, and it is only in the summing up of the whole that one can decide what is best. One cow is built along the best dairy lines save that a heavy, beefy brisket shows itself, and we wonder why she fails in her milk production at a time when we expect much. There is her weakness as a dairy animal, and the force of some beefy ancestor is felt as the period of lactation increases. Another is light in brisket, but while carrying the same dairy form in general, is stout and heavy in neck, and again an obstacle presents itself to check production. Put these two cows before a critical committee, in a field of cows as good as they, in other respects, but better in the two mentioned, and the owners of these two will criticise when the ribbons are distributed. Such weaknesses in confirmation would hardly be carried by members of a committee day after day, and to give the reasons for the award, a week after the gates closed, would be an impossibility. Give your judge the score card and the record in all future time will tell the story for itself.

One or two other points call for discussion. The time will come when breeders will demand, and societies will grant, more time to this work of awarding premiums, when we shall see its important bearing upon all progress and by the use of more individual judges be able to take up more effective work. If the object be to educate, then the exhibitor has the right to demand that the greatest possible amount of information be furnished by the men who are to award the ribbons. Money spent in this way will be productive of greater benefit to the state than for the usual round of amusements. Let the expert, as he goes to his work, take with him a boy and a blackboard, and as he marks up the scores on the cards, let the boy mark up the board. If the scores differ, the questions will be forthcoming, and right here we touch what seems to be ideal work along the line of substantial growth. It will require time and patience, but the man who contributes the stock has as good a right to faithful service as any other. Too long these rights have been neglected, because not demanded. Let the fullest discussion be fostered. There will be no awarding to owners in such a field, and the only point of variance will be that of judgment. Here the expert protects himself and the society by his record.

Until the time comes when this is possible, the experts should remain on the grounds at least one-half day after their work is completed, in order that disappointed exhibitors may seek them out and satisfy their wishes for information. On such occasions it is well to bring the animals together and indicate clearly the points of difference and the reasons for the awards. If the horse or cow has a large, coarse ear, a Roman nose, a thin or extremely thick lip, let these be indicated, and their effect upon disposition, which has so much to do with service, made plain. If you find the walls of the abdomen thin and drawn, the muscular development deficient, let the fact of lack of vitality be made clear to the grower or breeder. Falling back on the proposition that form must govern purpose, and that each and every part bears relation to every other, the force of these homely illustrations must be admitted.

But, you say, are these things necessary? Have we not seen good horses with Roman noses or dished faces, straight hocks or crooked; cows with heavy briskets or meaty shoulders, coarse ears and narrow thighs, which were good producers? Yes; surely we have, but whether they were the exceptions to the rule or not, the day has come when the currents must be controlled, in all our animals, to a larger degree than ever before, and to do this there must be a greater harmony of parts and a more perfect adjustment. Like the more intricate machinery necessary for the skilled workmen successfully to compete in the markets, that through reduced friction there may be a greater ratio of speed or, by more equal bearings, less false spots in the fabric, so in the profitable production of stock, or any of the farm products, there is demanded a better knowledge of the relation each part bears to every other, in order that the per cent. of waste, either in time, food or labor, may be reduced to the minimum and the quality of the output made most favorable for the success of the grower or manufacturer. From beginning to end the thought of business must be engrafted on every step. Admitting that there are problems in the animal economy not yet solved, and surely not to be controlled, may we not with justice claim that the measure of our ignorance is largely in proportion to the measure of our want of appreciation of the underlying principles at the foundation of this paper. I would, if possible, make imperative the necessity for this study of farm products by a scale of points and the use of the score card, for the simple reason that it lies at the root of successful farm husbandry, and the best system to be used in the awarding of premiums at any agricultural fair is the best for the individual to use in the more detailed study of animals and crops at home. The weaknesses of the system will disappear as one gets into sympathy and appreciation with the foundation on which it rests. It makes men more critical, more observant, more attentive to seemingly trivial things, and less likely to be carried away by some fancy point, made prominent, but having only a superficial bearing. There is danger that single parts will be magnified until their relation is lost. Thus one will be swept away by the switch of the Jersey, the knee action of the horse, the number of spikes on the comb of the Leghorn, or the beautiful color of the fruit. All these are of value, but do not determine worth. They are only fractional parts of a great whole. Another will ask only of production in the dairy cow, the record made by the horse, the weight of the hen, or the number of eggs, and the yield of the tree. These he will declare are essentials and nothing else can be. Is this true? Are we not called to look below the surface and learn more of the ground work on which the animal or tree stands. A friend, one of the large wholesalers, makes it a rule whenever a boy applies for a position first to study the boy and then study his mother. In the right blending of the natural traits and characteristics of the individual with those inherited from his ancestors, we are likely to find greatest excellence. Sure it is that along this line alone will progress be made in succeeding generations. Present so-called fancy points must give way for the substantials, and the standard moved up where it will bear solely on the question of merit. Color of tongue or switch, width of stripe, number of spots, or other arbitrary markings, unless they add to the intrinsic worth, must be set one side, and how is this to be so easily determined save by giving to each its true value and allowing the sum total to settle the worth of the whole. The superiority of the scale and score card will readily be admitted, but I make this plea for more systematic work in awarding premiums and for extended and critical examination by the state, through organized bodies, for two reasons, either of which justify the action:

1st. Because it is necessary in order to establish justice between exhibitors and place awards in accordance with merit.

2d. Because of the imperative necessity for raising the standard of quality in all products.

The day has gone, never to return, when we may expect largely increased prices for farm products. The outsweep of trade is touching the uttermost corners, and bringing them into close relations with the farms. We do not question to-day whether the onions grew in Egypt or New York so long as the price is not increased. For years we have been approaching this lower range of prices and values. It is one of the conditions of our outreaching civilization, and therefore inevitable. At the same time, in the wisdom which has ordained that man shall earn his bread by the sweat of his brow, it is established that there has been, is, and always will be, two conditions, the only limitations being the skill and intelligence of the individual—one is that of production and the other that of cost of production. The farmer faces these two unknown quantities, and the higher he reaches in output and quality, and the deeper he digs into the mysteries of food nutrients and food combinations, the surer and the greater will be his measure of profit, in all the years to come. It will be the putting together of the fragments here and there which will lead to better knowledge and therefore better methods, and again we are forced back upon this business proposition which lies very close at the root of the whole question. Greater skill comes only as the result of keener insight and more knowledge. These are not to be obtained save as one grows into an intimate acquaintance with the laws and conditions governing, seeks patiently to learn their relation to each other and the part each bears to the whole, and out of well-balanced judgment and experience applies this knowledge in the daily walks of life. This is the man who will always be master of the situation.

The Proper Beef Type.

Delivered before the New York State Breeders' Association, at Rochester, N. Y., by Prof. C. F. Curtiss, Ames, Iowa.

I wish to say at the outset that the impression that the success of mastering the great problems in the field of agriculture does not require special preparation and fitness as well as careful study and a high order of ability, is altogether erroneous. The idea that successful farming does not require a trained mind and the highest degree of intelligence, judgment and reason never had any foundation in fact. Robert Bakewell said over a hundred years ago that it was easier to find a dozen men fit for cabinet positions than one good judge of live-stock, and the conditions haven't changed very much even to the present day. Has it ever occurred to you that the ability simply to judge stock accurately and well is at least of a rarer kind, if not of a higher order, than that which interprets the laws of a nation. The men who are employed to pass judgment on the live-stock that goes to the great markets of this and other countries, men who are required to know simply one thing and know it thoroughly, command a higher salary than men who preside at the bar of justice in the highest courts of the land. This may seem like a striking statement, but nevertheless its truth is fully attested by the records and salaries paid for these positions; and if you were to hunt the country over, I will guarantee that you would find a hundred per cent. more men competent to serve as judges in the highest courts than are qualified to pass accurately on the real value and utility of live-stock. The men who are employed to do this work at the great market centers are thoroughly trained experts. They must be able to determine almost at a glance just how much and what kind of a product an animal will cut on the block, and the work will permit of no inaccuracy. Their judgment and the training of their mental faculties involve thousands and almost millions of dollars in a single day. Why should not a breeder and feeder have the same discriminating judgment? In other words, why is not the work of breeding, feeding and selecting domestic animals more of an exact science? Simply because of lack of training. To put it in other words and more plainly, men fail to breed good animals primarily because they do not know what they are—because they have wrong conceptions and wrong ideas of standards of excellence. A celebrated artist when asked to name the first essential to success in his profession replied "to see right." So it is in this field; no one ever succeeds without first seeing right. A man can no more attain the highest excellence and skill in agriculture without a clear mental conception of his object than can an artist produce a great masterpiece without a right conception of what constitutes the highest art.

During the closing days of the recent Trans-Mississippi Exposition at Omaha, while the stock show was in progress, a very successful shepherd, a man who was a real artist and a master hand at his profession, showed a sheep from his father's flock in England that was very much admired by all who saw it; a sheep that was a marvel of excellence in all qualities that go to make up a perfect sheep. "Where was that sheep bred?" inquired an interested stockman. "Ah," replied the young man, "that sheep was bred in England before I was born," meaning by the reply that it had taken fifty years of constant, thoughtful, painstaking and intelligent work to bring that animal to its present state of perfection.

Good stock does not come by chance nor by haphazard methods. During the Trans-Mississippi Exposition at Omaha, to which I have referred, a students' live-stock judging contest was held, open to all of the agricultural colleges of the United States. There were seventeen contestants, representing five colleges. Each student was examined thoroughly on two classes of hogs, two of cattle and two of sheep, and one of the examiners in that contest, a man who was himself a practical, experienced stockman, and one of the keenest and most intelligent judges of our country, said that the young men whom he had examined were capable of going into the best herds and flocks of the country and selecting the best animals and giving a sounder and more intelligent reason for sustaining their judgment than nine-tenths of the owners or proprietors of these herds and flocks. You may ask why this was the case and why those boys were able to do such creditable work? I reply that it was simply by reason of thorough study and intelligent methods of investigation, by a careful and critical faculty of observing live-stock which comes from analyzing the merits of animals point by point and considering the reasons and their logical results.

A brief consideration of the qualities of practical excellence in beef cattle may well engage the attention of the breeder and feeder. A topic of this character is too often regarded as of interest only to the professional exhibitor or the lecture-room instructor and student. But every successful breeder must always be a student, for the first essential in successful breeding is a clear conception of what constitutes a good animal and of all the characteristics that go to make up real excellence in a herd. It is said that the late renowned Amos Cruickshank, the founder of the great Scotch tribe of Shorthorns, was often seen by the side of the leading sale rings of Great Britain intently studying every animal that came into the ring, and his minute knowledge of all the animals shown was the marvel of those who chanced to converse with him about them afterwards. While the methods of the justly celebrated Robert Bakewell, the first great improver of live-stock, were largely secret, it is known that he was not only an exceedingly close student of living forms, but that his rooms were also full of models and parts of domestic animals that he had carefully dissected and preserved for future reference. In his work of selection and improvement he imparted to the Leicester sheep such a remarkable aptitude to take on flesh that this quality remains, even to the present day, a characteristic of the breed to a greater degree than of any other long-wooled breeds of England.

This aptitude to take on flesh is of vital importance to the beef producer as well as the breeder of show-ring and sale stock. The show-ring type must necessarily keep close to and be largely governed by the practical demands imposed by the feed yard and the block, else the lessons of the show yard and sale ring are without value, if not positively misleading. No one is more concerned in what constitutes the essential qualities of a good beef animal than the man who breeds and feeds for the block and attempts to meet the conditions imposed by the market; for it must be kept in mind that this is the ultimate end of all beef stock, and the best beef animal is the one that carries to the block the highest excellence and the most profit. This, in a word, is the key-note of the whole problem.

The Beef Type.

There is at the outset a well-defined beef type that admits of less flexibility than is generally supposed. We hear much about the dairy type—and there is a dairy type, fairly clean cut and well defined—but there is also a beef type, more clearly defined and less variable than the dairy type. Common observation and experience confirm this assertion. There are not a few cows of quite positive beef tendencies capable of making very creditable dairy records, and a great many that combine milk and beef to a profitable degree, but a good carcass of beef from a steer of a pronounced dairy type or breed is rarely seen. So clearly and definitely is this beef type established that to depart from it means to sacrifice beef excellence.

The accompanying illustrations (Figs. 1, 2 and 3) pretty accurately represent the ideal beef type. The first is a good reproduction from a photograph of a prize-winning Angus heifer exhibited by Queen Victoria at one of the late Smithfield fat stock shows. The next is a portrait of a high-grade Shorthorn steer, raised as a skim-milk calf at the Iowa Experiment Station. He was the best steer in the Chicago yards on a day when there were

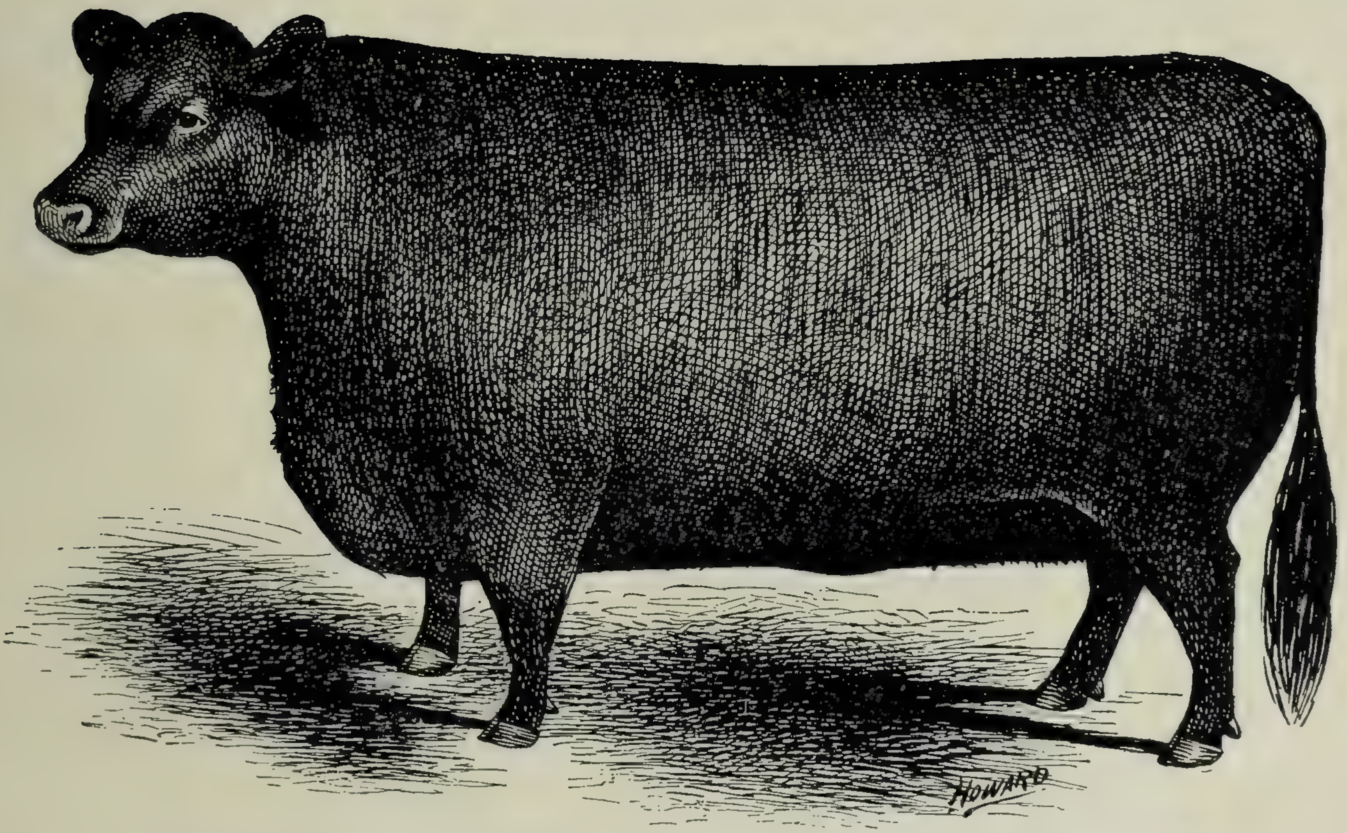

Fig. 1—Champion Angus Heifer, Smithfield (England) Fat Stock Show.

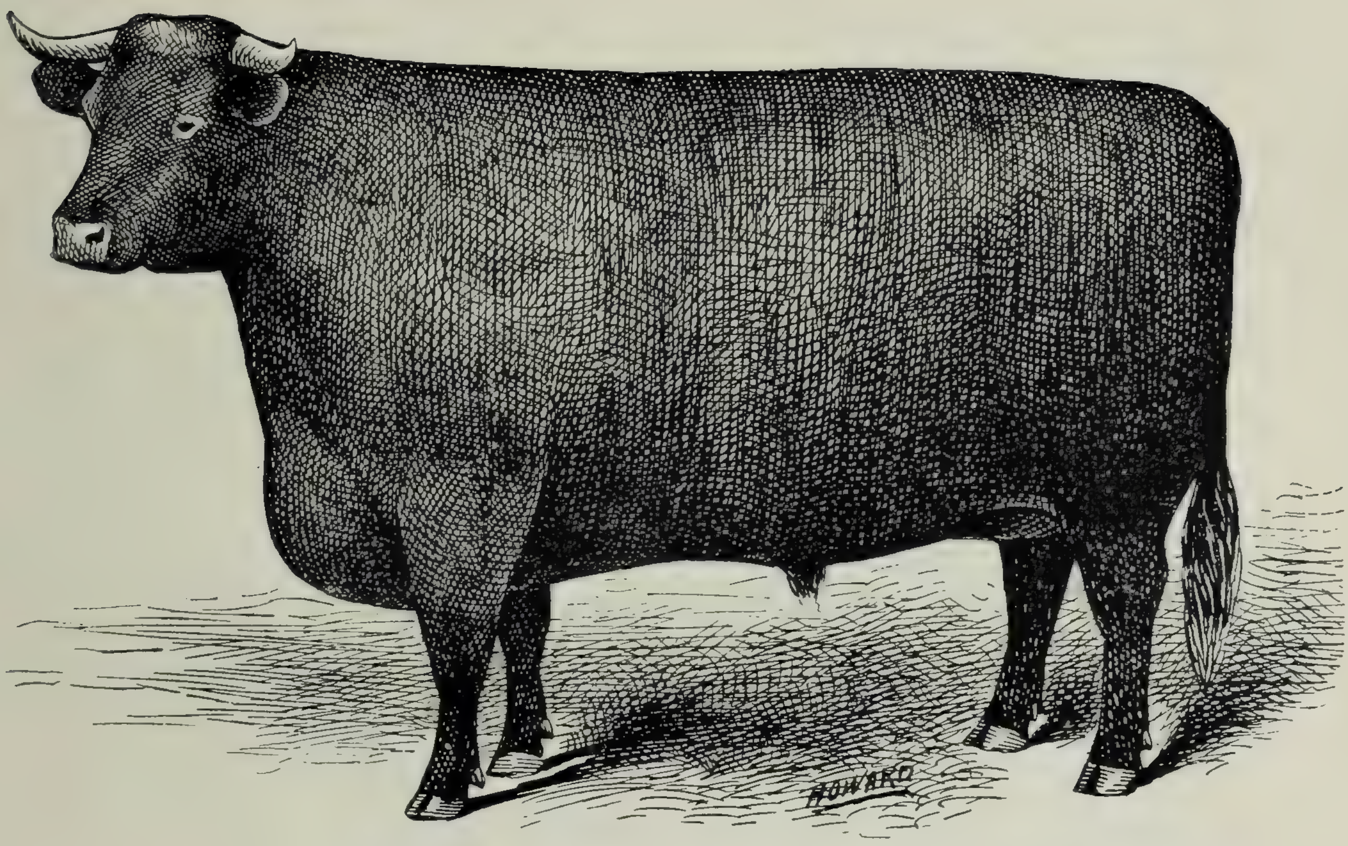

Fig. 2.—High-grade Shorthorn steer.

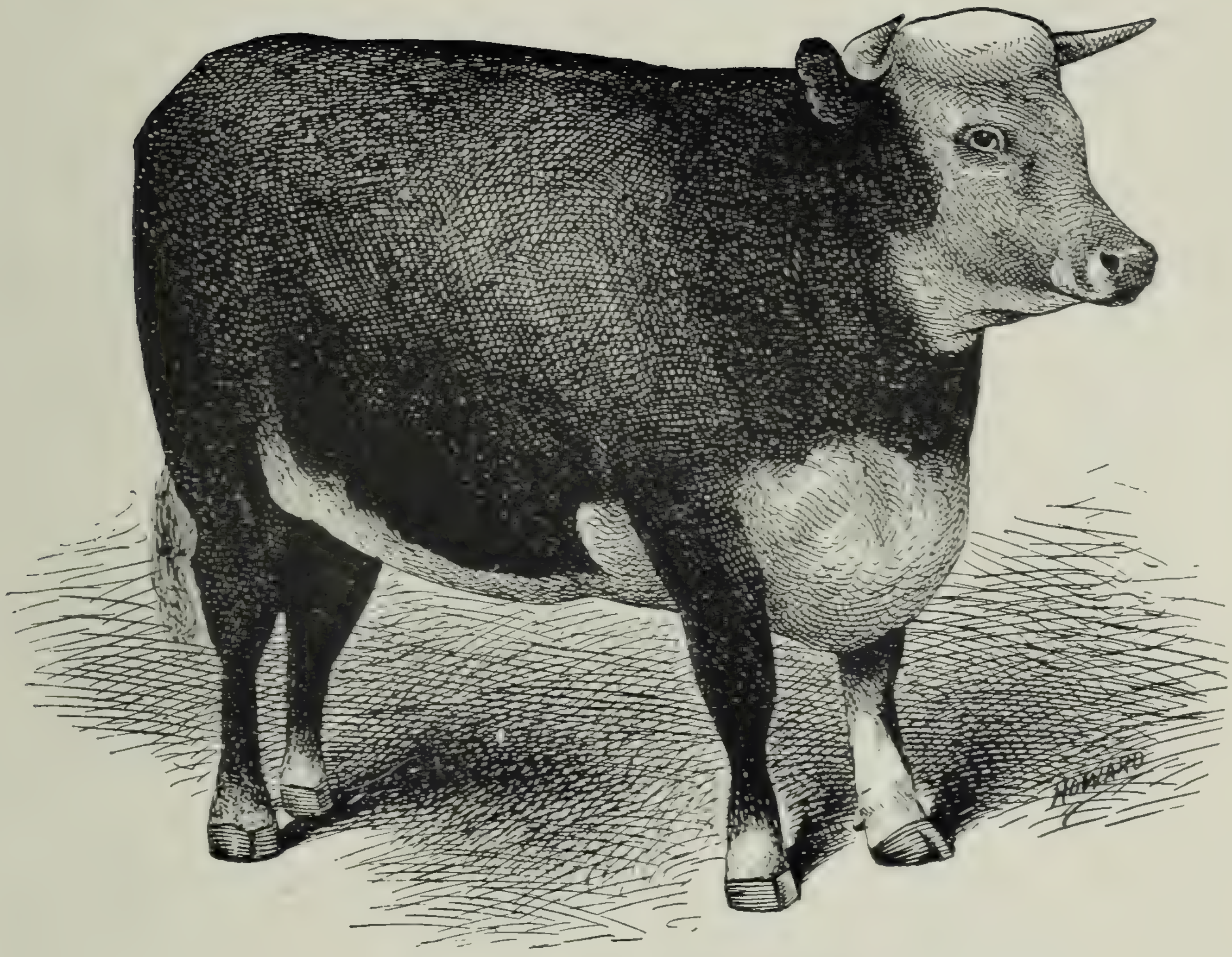

Fig. 3.—High-grade Hereford steer.

26,000 cattle on the market. The third is of a high-grade Hereford steer, fed at the Iowa Experiment Station, that was good enough easily to top the market, and was one of a carload to dress an average of 67.5 per cent. of net beef. He weighed 1620 pounds when two years old.

These animals, though representing different breeds, present that compactness of form, thickness and substance, together with superior finish and quality, coupled with an inherent aptitude to lay on flesh thickly and evenly, that always characterizes the beef animal of outstanding merit.

These points are more specifically itemized in the following score card prepared for the use of students at the Iowa Agricultural College:

Scale of Points.

A. General appearance (25):	Possible score.
Weight, estimated, ——— lb.; actual	..
Form and size, smooth, even, parallel lines, deep, broad, low set	10
Quality, thick covering of firm flesh, mellow touch, soft, heavy coat, fine bone, velvet-like skin	10
Style, vigorous, strong character, active, but not restless	5
*Objections, rough or angular in form, harsh coat, hard skin, dull appearance	..
B. Head and neck (10):	
Muzzle, broad; mouth large, jaws strong, nostrils large	2
Eyes, large, clear, placid	2
Face, short, quiet expression	1
Forehead, broad, full	1
Ears, medium size, fine texture	2
Neck, thick, short and full, throat clean	2
Horns, fine texture, medium size or small	..
*Objections, long or lean head and neck, dull eyes, coarse, heavy horns	..

	Possible score.
C. Forequarters (10):	
Shoulder, covered with flesh, compact on top, smooth	4
Brisket, compact and wide	3
Dewlap, full, skin not too loose and drooping	1
Legs, straight, short, arm full, shank fine, smooth	2
*Objections, bare shoulders, narrow on top, contracted brisket, coarse legs	..
D. Body (35):	
Chest, full, deep, wide; girth large, crops full	8
Ribs, long, arched, well covered with firm flesh	7
Back, broad, straight, smooth and even	10
Loin, thick, broad, full	6
Flank, full, even with underline, or nearly so	4
*Objections, narrow or sunken chest, hollow crops, sloping ribs, bare or rough back and loin, high flank	..
E. Hindquarters (20):	
Hips, wide, smooth, well covered	5
Rump, long, even, wide, smooth, not patchy	4
Pin bones, wide apart, smooth, not patchy	2
Thighs, full, deep and wide	2
Twist, full, deep, large, level with flank or nearly so	3
Purse, full, indicating fleshiness	2
Legs, straight, short, shank fine, smooth	2
*Objections, prominent, rough hips, narrow or bare rump, spare thighs, light twist, small purse, coarse legs	..
Total	100

The Use of the Score Card.

The score card is an educator and of great advantage to the student, but its use is not generally favored in the show-ring by leading judges. The judge who goes into the show-ring, like the expert buyer in the great markets, should carry a well-defined

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*The score card as used in the classes contained an additional column for marking the student's estimate of deficient points.

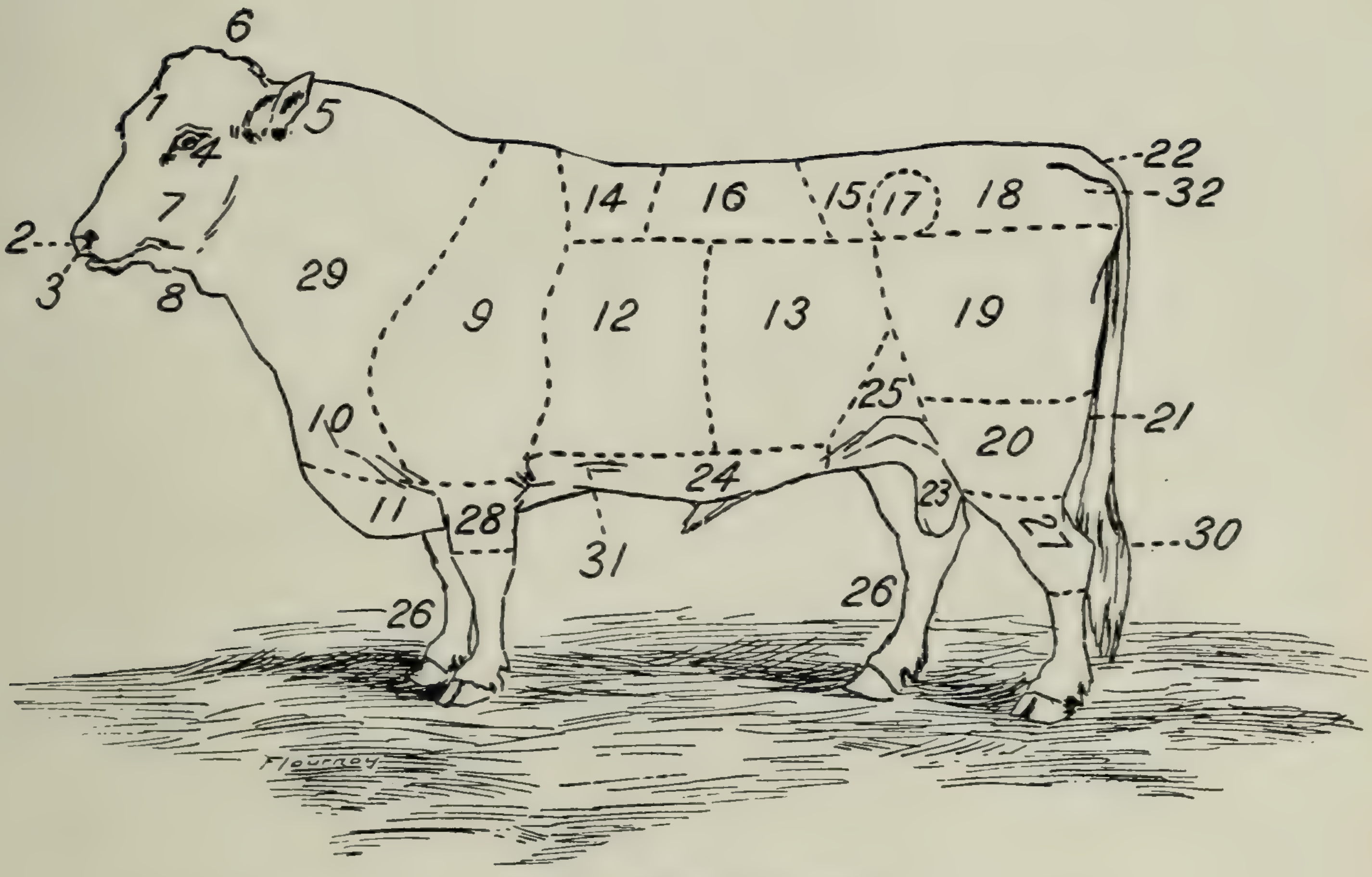

Fig. 4.—Names of points.

1. Forehead and face.
2. Muzzle.
3. Nostrils.
4. Eyes.
5. Ears.
6. Poll.
7. Jaws.
8. Throat.
9. Shoulders.
10. Chest.
11. Brisket.
12. Fore ribs.
13. Back ribs.
14. Crops.
15. Loins.
16. Back.
17. Hooks.
18. Rumps.
19. Hindquarters.
20. Thighs.
21. Twist.
22. Base of tail.
23. Cod purse.
24. Underline.
25. Flanks.
26. Legs and bone.
27. Hocks.
28. Forearms.
29. Neck vein.
30. Bush of tail.
31. Heart girth.
32. Pin bones.

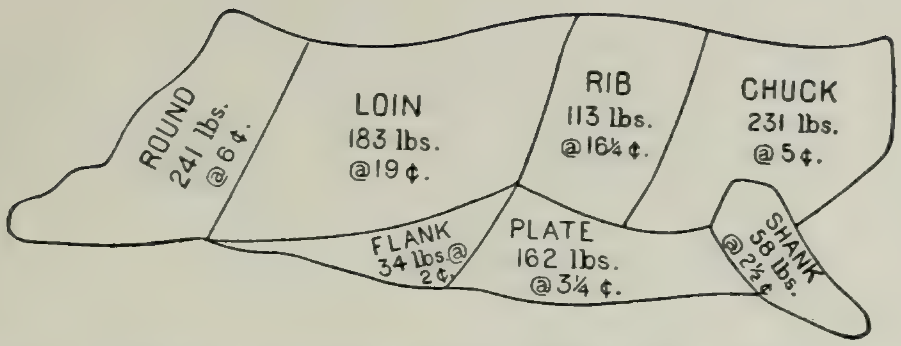

Fig. 5.—Chicago wholesale dealers' method of cutting beef.

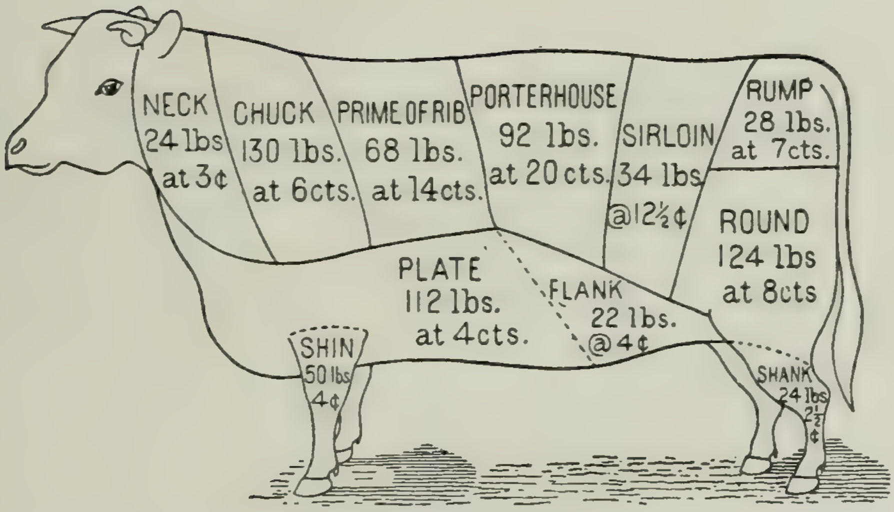

Fig. 6.—Chicago retail dealers' method of cutting beef.

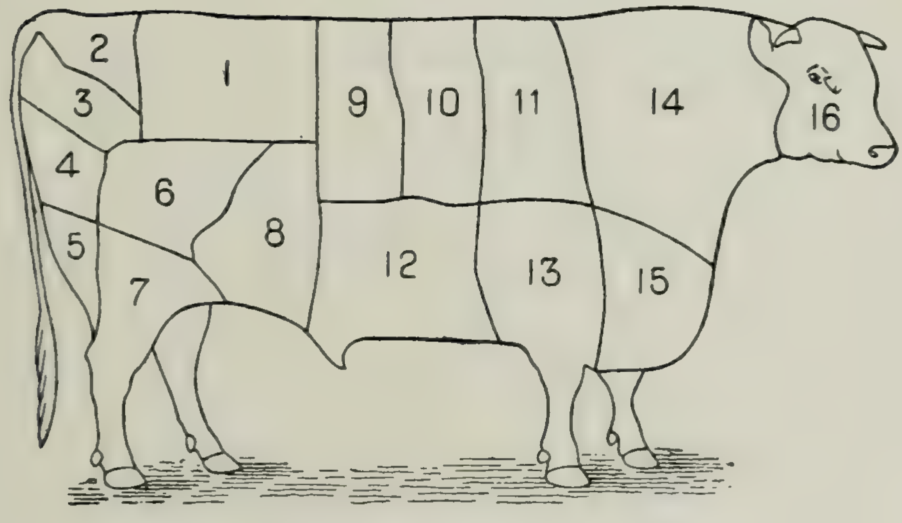

Fig. 7.—English method of cutting beef.

mental conception of a good animal and be able to detect at once the qualities that are objectionable. This applied to the animals of a ring virtually amounts to the use of a score card without the objectionable features of that system. In recommending the score card to the student, the term "student" is used in its broadest sense, embracing not only the prospective breeder within the class room, but every member of the great practical school as well who wishes to keep in the foremost rank of his profession.

It is not necessary here to take up in detail all the points enumerated in the foregoing score card, but it is proper to discuss briefly the controlling principles and logical reasons that govern the formation of a standard of excellence of this nature. The analytical method of resolving every problem into scientific formulas and principles, based on the firm foundation of unquestionable truth, is the intelligent method of study and investigation, and this method ought more generally to prevail in agriculture.

Beef Characteristics Briefly Defined.

The first thing that should be looked to is the general beef form—low, broad, deep, smooth and even, with parallel lines. No wedge shape or sharp protruding spinal column is wanted for the block. Next in importance is a thick even covering of the right kind of meat in the parts that give high-priced cuts. This is a very important factor in beef cattle that is often overlooked. The accompanying illustration (Fig. 5), represents the wholesale method of cutting beef, showing the relative importance and value of the different parts. In a test made in Chicago on six representative beef animals—two Shorthorns, two Angus, and two Herefords—fed and marketed by the Iowa Experiment Station, the cuts designated as "rib" and "loin" averaged 27.8 per cent. of the aggregate weight of the carcass and sold for 63.9 per cent. of the total value. By this method the chuck, or shoulder, and rib cuts are divided between the fifth and sixth ribs, and in doing so the knife is run close up to the shoulder blade. The rib and loin cuts are divided between the twelfth and thirteenth ribs, and the loin is separated from the "round" at the point of the hip. In cutting for the retail trade the "rib roast" is taken from the cut designated "rib," and the "porterhouse" and "sirloin" cuts are taken from the loin cut. Tenderloin steak is taken from the inside and just beneath the ribs on either side of the spinal column, and the commercial beef tenderloin always comes from inferior stock, mainly from "canners." That class of cattle has no other meat that is desirable for the block, and the tenderloin strips may be pulled out and put on the market, while the remainder goes into the boiling vats for canned or pressed beef. To take tenderloin steak from good carcasses would destroy the value of the "porterhouse" cuts. This the dealer never does. The other retail cuts and their relative values are shown in the second diagram (Fig 6). The third illustration (Fig. 7) represents the retail method of English butchers.

The Chicago and New York markets discriminate more sharply and present a wider variation in the relative price of the prime and coarser cuts than any other markets in the world. By reference to the wholesale method of cutting beef used by Swift & Co., and the actual wholesale selling prices of the several cuts taken from a bunch of cattle sold this firm by the Iowa Experiment Station, it will be seen that the rib and loin cuts command over four times the average price paid for the remainder of the carcass, and it is apparent that the practical beef animal must be good in these parts. Broad, well-covered backs and ribs are absolutely necessary to a good carcass of beef, and no other excellencies, however great, will compensate for the lack of this essential. It is necessary to both breed and feed for thickness in these parts. And mere thickness and substance here are not all. Animals that are soft and patchy, or hard and rolled on the back, are sure to give defective and objectionable carcasses, even though they are thick, and they also cut up with correspondingly greater waste.

A marked and important change has taken place in the profitable type of cattle within comparatively recent years. This change is strikingly illustrated in the development of the Shorthorn. By the courtesy of that veteran feeder and most excellent authority on live-stock, the late William Watson, I am permitted to furnish a good illustration (Fig. 8) of the popular type of beef animal about the beginning of the present century. At that time Culley said, in one of his contributions on live stock, that the "unimproved" breeds of Teesdale were a "disagreeable kind of cattle, that, though fed ever so long, never produced any fat, either within or without." Youatt, another celebrated author, described them as "generally of great size, thinskinned, sleek-haired, bad in handling, coarse in offal, and of delicate constitution." With this as a foundation stock, it is not so difficult to understand how an animal of the Newbus ox stamp might be classed as belonging to the improved order. This ox was sired by a grandson of Charles Colling's celebrated bull "Old Favorite," and the dam was supposed to be a Scotch Highland cow. The early Shorthorns were large and massive. The famous Durham ox weighed nearly 3800 pounds when 10 years old. The demand for early maturity and plump, sappy carcasses of medium weight and minimum offal and waste had not then set in. It was not until within recent years that the heavy, inordinately fat, or rough and patchy bullock, became unpopular to such an extent as practically to drive this class from the market and to banish the type from the breeding herds. It is well that this was done, for the modern type, represented by the first three illustrations, makes beef at decidedly more profit and economy to both the producer and the butcher and furnishes the consumer a far superior article.

The parts furnishing the high-priced cuts must be thickly and evenly covered with firm yet mellow flesh of uniform good quality and alike free from hard rolls and blubbery patches. Coarse, harsh and gaudy animals will no longer be tolerated, much less those that are bony and bare of flesh on the back and ribs. The men who buy our cattle and fix their market value are shrewd enough to know almost at a glance how much and just what kind of meat a steer or carload of steers will cut out, and if the producer overlooks any of the essential points he is compelled to bear the loss.

Then, in addition to securing the general beef form and make-up, together with good backs, ribs and loins, there is a certain quality, character, style and finish that constitute an important factor in determining the value of beef cattle. One of the first indications of this is to be found in the skin and coat. A good feeding animal should have a soft, mellow touch and a soft but thick and heavy coat. A harsh, unyielding skin is an indication of a sluggish circulation and low digestive powers. The character and finish exemplified by a clear, prominent yet placid eye, clean-cut features, fine horn and clean, firm bone, all go to indicate good feeding quality and a capacity to take on a finish of the highest excellence, and consequently to command top prices. Coarse-boned, rough animals are almost invariably slow feeders and hard to finish properly. A certain amount of size is necessary, but it should be obtained without coarseness. The present demand exacts quality and finish rather than size.

Beside these qualities, and above all, it is necessary to have vigor and constitution. We find evidence of these in a wide forehead, a prominent brisket, broad chest, well-sprung ribs, full heart girth, and general robust appearance; and without these, other excellence will not have its highest significance.

Excellence for the Block Due to Inherited Quality Rather Than Feed or Gain.

The misleading practice of rating beef animals mainly by the gains made in the feed yard is altogether too common. The distinction between cattle of different types is absolutely essential to profitable feeding. There is not a very great difference in the rate of gain, or the number of pounds of increase in weight from a given amount of feed, that will be made by a representative of the best beef breeds, or by a genuine scrub, a Jersey or a Holstein steer. This statement may seem somewhat at variance with prevailing opinion concerning the potency and superiority of improved blood. Practical breeders and improvers of live-stock have been rather reluctant to recognize this doctrine, and a good many will not concede it yet, but the evidence is constantly accu-

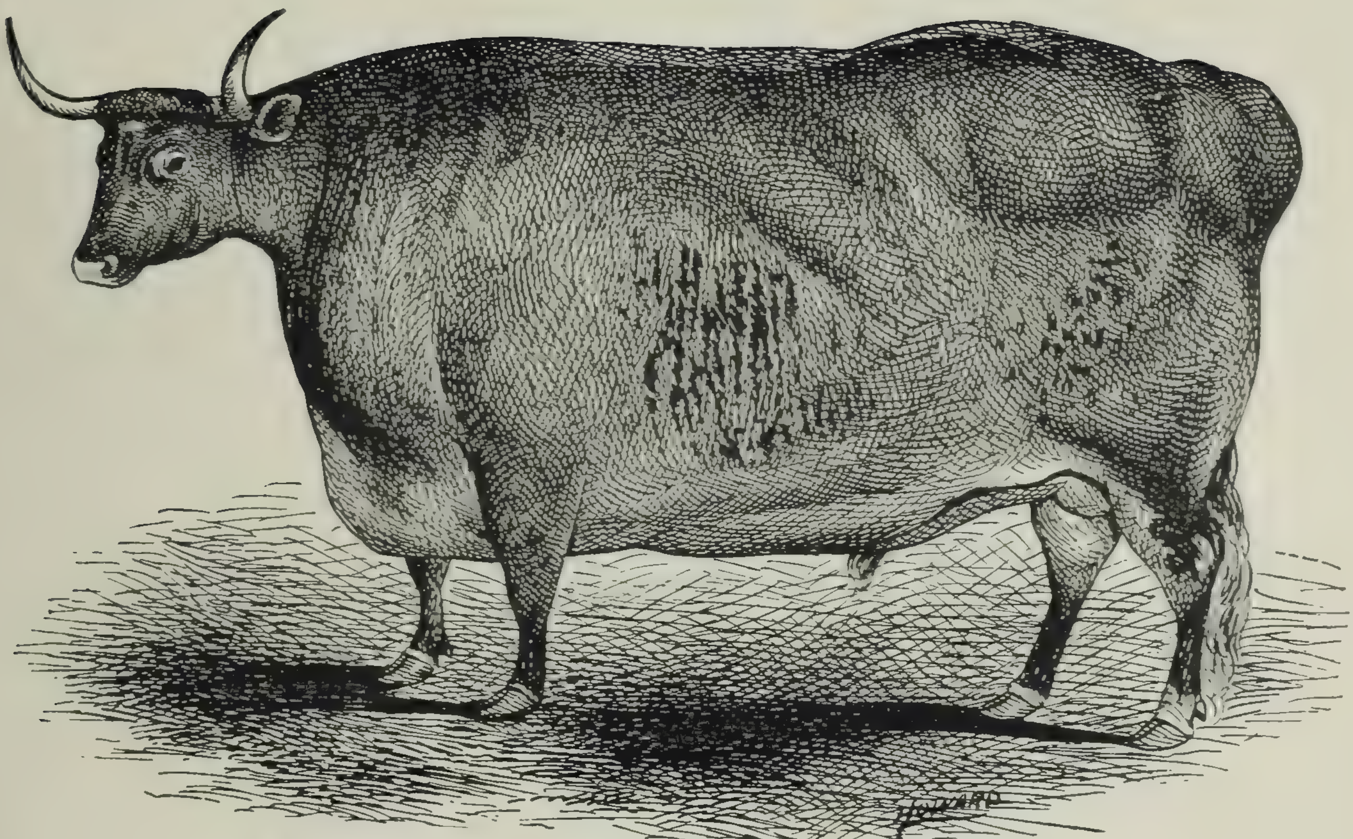

Fig. 8.—Newbus ox.

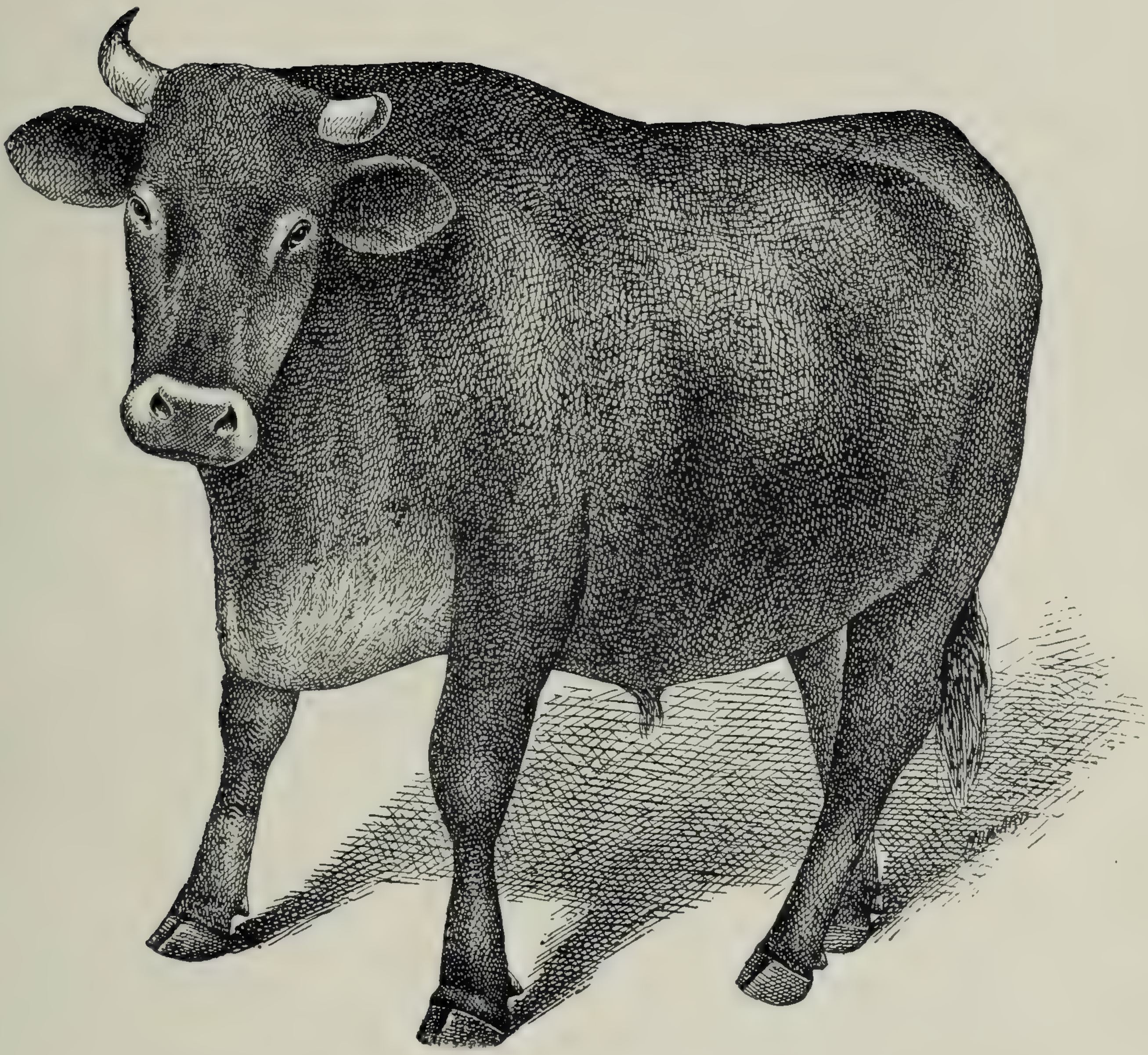

Fig. 9—An unprofitable feeding type.

mulating; the principle has been repeatedly demonstrated, and it is useless to ignore facts.

After all there is no well-founded reason why a Shorthorn, an Angus, or a Hereford should make more gain in weight from a bushel of corn than a native or scrub. This is governed altogether by the digestive and assimilative machinery of the steer. The Holsteins, for instance, are well known to be hardy and extremely vigorous eaters. They consume large quantities of feed, and render good returns for their rations, and the despised scrub has a ravenous appetite, and is almost as omnivorous as a goat. It is not reasonable to expect that the improved breeds, notwithstanding their superiority in other respects, have inherited any greater constitutional vigor or more perfect working organs of digestion than those animals belonging to the class designated as natives, or scrubs, which, from the nature of their surroundings, and the very law of their existence, have been inured to all kinds of hardship. Nature's law of the survival of the fittest was more rigid and exacting than the selection of the average modern breeder. Why, for instance, should a Shorthorn or a Hereford steer be able to utilize a larger proportion of a given ration than a Holstein? Has not the latter been as highly improved, as carefully and as continuously bred for the express purpose of making good return for a liberal ration? Scientists have discovered that civilized man has no greater powers of digestion than the barbarian or the Indian. Neither has the improved steer materially better digestion than the native. The feeder is often deceived in the belief that he has a good bunch of cattle simply because they feed well and gain rapidly. Economy of production is an important factor, but it is by no means all. It is even more important to have a finished product that the market wants and will pay for than it is that it should simply be produced cheaply.

The illustration (Fig. 11) represents a high grade Jersey steer, fed and marketed by the Iowa Agricultural Experiment Station. This steer was fattened and finished for market under conditions quite similar to those of the Shorthorn and Hereford steers previously spoken of, and the rations were practically the same.

The Types Compared.

In making a comparison, only the Hereford will be used, but the distinctions are equally applicable to either. While in the feed lot the Jersey made a gain of 2 pounds a day for nine months and the Hereford 2.03 pounds a day for fourteen months. There was practically no difference in the rate and cost of gain. Judged by the record they made up to the time they went to market, the Jersey would take rank close to the Hereford in both rate and economy of gain. But the interesting part of the comparison came later. The Jersey took on flesh rapidly and was exceedingly fat and well finished. He was as good as it is possible to make a Jersey steer. Yet, when he went to market he had to sell $2.12½ below the top quotations, while the Hereford was one of a carload to sell 10 cents above the top for any other cattle on the market. It is sometimes claimed that this distinction is partly due to prejudice, but since I have followed cattle through the feed lot and to market and onto the block, carefully ascertaining all the facts for several years, I am convinced that the expert buyers who fix the price for beef cattle in the great market centres rate them strictly on their merits, entirely independent of any breed or type consideration. The controlling factor is the utility and inherent value of the animal for the practical test of the butcher. The slaughter and block test clearly revealed the reasons for this marked distinction in the selling value of these two steers.

The Jersey belongs to a breed that has been developed for centuries for the specific purpose of making butter; that is, putting the product of its feed into the milk pail. They are rough, angular and bony, and when fattened they do not put the fat into the tissues of the high-priced cuts of steaks and roasts on their back, as a representative of the beef breed does, but this steer had 190 pounds of what is termed loose, or internal, tallow and 55 pounds of suet on a 763-pound carcass; that is 32.1 per cent. of the steer's carcass was tallow. Tallow was at that time worth 4 cents a pound, while the best loin cuts were worth 19 cents at wholesale. And beside that, this steer only dressed 57.5 per cent. of beef, while the Hereford dressed 67.5 per cent. Then, the Hereford had only 95 pounds of tallow and 38 pounds of suet on an 888-pound carcass, equivalent to 15 per cent. And beside this striking difference in the percentage of meat in the high-priced cuts, the meat of the Jersey was much inferior to that of the Hereford. The Jersey steer went on accumulating fat around his paunch and internal organs to the extent of nearly one-third of his entire body weight, while he did not have meat enough on his back decently to cover his bones. This explains why a Jersey or a Holstein, or any other animal not expressly bred for beef, can never be made plump and smooth, no matter how long it is fed or how highly it may be fattened. Besides, what scanty flesh that is there will be found of inferior quality owing to the absence of that fat deposited throughout the tissues of the meat that is necessary to a ripe, juicy and highly flavored cut. There is a fundamental and essential reason why rough cattle do not sell. These same distinctions are largely true of the native and all other unimproved cattle when an attempt is made to fatten them for beef. The men who buy them are well aware of these distinctions and they fix their market values accordingly.

It is of vital importance, then, that the feeder should have the right kind of cattle for fattening. The Jersey and the Hereford steers previously referred to made practically the same gains in the feed lot and at substantially the same cost per pound for feed consumed, but the market comparison revealed the fact that the steer of beef type and inherited beef-making capacity was making a product worth 49 per cent. more than the other steer, and this increased value not only applied to the gain made in the feed yard, but to the entire carcass as well. The feeder cannot afford to ignore these distinctions. They are of vital concern and determine profit or loss. If the producer were hauling his corn or other products to market, instead of feeding it to cattle, he would not hesitate to select one that would return 49, or 25, or even 10 per cent. more than another. The loss cannot be afforded in either way.

Growing Potatoes Successfully in New York.

By T. B. Terry.

Farmers who have nearby markets can grow potatoes almost any way and get along. Those who raise this crop to ship to market, or to sell to shippers, have to manage carefully to make anything in the future. The former sell to the consumers, or to the retail grocers. They get almost all there is in the business. The latter have to pay commissions and profits to dealers and freight to railroads. Potatoes are now grown by the hundred acres on a single farm in Aroostook county, Maine, in Michigan, Wisconsin, Minnesota, Kansas, etc., etc. Many of these growers have rich land and great, clean fields, without obstruction. Large shippers get rebates from the railroads, at any rate they can get their potatoes, hundreds of car-loads, moved long distances for very little money comparatively. Machinery is used on these great fields to produce the crop as cheaply as possible. Growers of potatoes for shipping, in New York, have to meet this competition. A few years ago they did not. High freight rates prevented the moving of potatoes long distances. But all this is changed. It will require the best methods in the future to make money growing potatoes, on the average.

Cheap Fertility.

The large growers above named, except in Maine, are not purchasing plant food to any extent. They have enough in their soils, or at least they get along with what they have. Aroostook county, Maine, has used large quantities of fertilizers for potatoes; but the writer was there some years ago, talking to large audiences and telling them they ought to grow clover in regular rotation and reduce the fertilizer bill. Reports from there show they are working in to this way of producing the crop cheaply. The climate favors these Maine farmers, and many in the other northern States named. It is easy to grow large crops. Fertilizers may pay New York farmers well, but they cost money. To compete with the northern world they must get fertility for less money. They must pay more attention to growing clover and peas in regular rotation with potatoes and other crops. A heavy crop of clover grown once in four years may get hundreds of pounds of nitrogen out of the air and make it available for potatoes, corn, etc., that follow. You cannot afford to pay $15 or $20 a hundred pounds for this when you can manage to get it for nothing. The clover will pump up plant food from the subsoil, also, and leave that available. The big western growers are getting hold of this matter. The writer has talked to many of them in Minnesota, where they are growing clover and increasing their crops; so much the worse for you if you do not do the same.

Many of the northern growers have made the serious mistake of growing potatoes either continuously, or too frequently, on the same land. Do not do this. You will soon have serious trouble from scale, blight, rot, etc., which multiply and increase more rapidly where the crop is continuously grown. And then more plant food must be purchased under this method of management. Do not grow potatoes oftener than once in three years on the same land. The writer has followed for many years a three-year rotation of clover, potatoes and wheat. These were early potatoes, so we were able to get them off in time to put in fall wheat. With late potatoes, oats or spring wheat could be substituted. This rotation is all right for a few years, but a four-year one would be safer in the long run. We have grown clover pretty often; we may have trouble from this. Scientific men think we may. But meanwhile we have made a nice sum of money growing potatoes that feed on the plant food the clover obtained. We have not purchased fertilizers. And still few, probably, have done any better than we have with this crop, and our land was in poor shape to start with.

If you care to grow corn, I advise this rotation: Clover, corn, potatoes and small grain to seed with. Manure the clover sod for corn. Keep stock enough to eat the clover, and corn, oats and some purchased food, and use the straw for bedding. Save all the manure, liquid and solid; not sort of half way, but actually *all* of it. That is the way we do. Have cement floors under all live-stock, manure shed, etc. These last points are of great importance to you. I'll tell you why. The large western farmer won't get to this point for some years to come. You get right at it and you can increase your crop, in connection with other good methods, so as to compete with him. You may say you can't make the clover grow now. But you must. Where there is a will there is a way. I saw on an old "worn out" (?) farm in Vermont, last summer, as fine clover as ever grew on earth, many acres of it, on the farm of C. F. Smith. This man's neighbors said clover would not grow. Well, Mr. S. made it. You can. With him it came from the use of lime and potash, and an increase of vegetable matter in the soil to decay, and persistent sticking to it. The clover grew better and better each time it came around in the rotation. In the northern part of the State you may grow good feed and increase fertility by raising field peas, in connection with oats, to hold them up. I do not need to tell you that hay made from peas, oats and clover, nicely cured and early cut, is worth nearly as much again per ton as timothy for cows, young growing animals, sheep, etc. You get this in addition to the fertility.

The Best Tillage.

One can hardly expect the western farmer, with his great fields, to be very thorough in his tillage. The tendency there is to get an income from the number of acres, rather than from the yield per acre. Here is a chance for the New York farmer. Till thoroughly from beginning to end. Do the best that is known now along this line. There are probably fifteen or twenty tons of nitrogen, phosphoric acid and potash in one acre of your potato land, within one foot of the surface. But it is locked up by nature and only a very little becomes unlocked and available for crops each year, with ordinary tillage. More tillage of the right kind will make more of it available. This will be particularly true when you supply your soil with plenty of vegetable matter to decay in it by growing heavy crops of clover, manuring, plowing in catch crops, etc. Work the seed bed more. Work it deeply. Work it roughly, that is, throw it around a good deal and mix it up. Make it fine, where it is clayey enough to form lumps. Do all working when it is rather dry. Cultivate the crop many times; keep stirring the ground, as long as you can get a horse through it. Go as deeply as you can for a week or ten days after you can see the rows, and then after that never more than two inches deep. Before your potatoes (and corn) are six inches high the roots come together between the rows. If you tear any of them off, as you will if you go more than two inches deep, the plants must grow them over again. In a dry time this means serious loss, in particular. You do not need to stop this kind of culture at blossoming time; it can do no harm and usually will do much good. Look on the potato field as a summer fellow that you will work about all summer, and grow potatoes while you are doing it. You may make much plant food available in this way, not only for the potatoes but for other crops following.

In the spring there is usually plenty of water in the soil and subsoil. If you do not do your part a good proportion of this may be taken up into the air by sun and wind, and wasted. Two inches of freshly-stirred, fine soil makes almost as good mulch as a foot of straw. Keep this earth mulch present from the moment the ground is dry enough to harrow, in the spring, until the potato crop is grown, as nearly as is practical. In connection with the vegetable matter mentioned above in the soil, to hold water, your tillage may make you a fair crop, almost without regard to rainfall. In stirring the ground to make more plant food available, do the work also at just the right time to form a mulch and check evaporation. Never let the surface dry up hard after a rain. You can use a smoothing harrow until the crop gets up; then a weeder is better, after the tops are too large for the weeder, and also in connection with weeder use one-horse cultivators, with many small teeth. We have planted four inches deep and then did not hill up any, at least not more than an inch or two. Some earth will be thrown to the rows. Remember that weeds take a great quantity of water out of the soil. To grow a ton of dried weeds on an acre would mean the loss by evaporation through the leaves into the air of some 300 to 400 tons of water. Often the potatoes seriously need the water. Don't let the weeds use it up. Keep the surface so constantly stirred with smoothing harrow, weeder and cultivator that no weeds practically can ever see day light; then they will be killed as they sprout in the soil.

Do you think the large western grower will give careful attention to all these points? Well, I am afraid not, usually. It is a grand chance for you to get ahead of him. Till thoroughly to help feed your crop, and to water it. This is no idle tale; no theory. The writer has made thousands and thousands of dollars by putting into practice for many years all that is written here. He has grown large crops without fertilizer, over and over again. He has grown large crops ($100 to $160 per acre), almost without rain, right in the midst of failure. In the worst seasons he has cleared a hundred dollars an acre on potatoes over all cost, and furnished neighbors with what they wanted to eat, although they planted in the spring, and on just such land as his. Man can do almost anything, and he believes in doing it and making success come.

Other Pointers Briefly Outlined.

Above you have a foundation that is solid and good. One can not enter into the small details of the business in a brief article like this. It would require a book. But I will try to give you a few important pointers. The western man drives about five horses, that draw a wide disk harrow, and leads three more that are following with a smoothing harrow, across his long fields. Change your fields so as to make them as long as you can and get large tools and drive more than two horses. If you are going to grow potatoes to sell to shippers, or to ship yourself, grow enough to amount to something; enough so that you can afford the best labor-saving tools on the market. The Robins planter is the best one made. The Hoover digger is almost perfect, under any reasonable circumstances. I say this after riding on it many seasons. We use four horses to draw it. Of course being all iron it is not fit to dig soft, green potatoes. We have found it well to use potato boxes for handling the crop, by the hundred. They are 16x13x13 inches inside, with hand holes in the ends and made of very light wood. They hold one bushel (60 pounds) even full; thus one can be placed on another.

Find out what varieties of potatoes do best on your soil and in your climate and then stick to them as long as they do well, and select the best for seed each year. Don't grow more than one or two kinds. Straight goods sell far better than mixed. Keep your seed so that no sprouts will start until after the potatoes are in the ground, for main crop. The first sprout gives the strongest plant. You can sprout a few in the light for early ones. Do not apply fresh manure on land for potatoes. Put it on at least the fall before hand.

In the four-year rotation named (clover, corn, potatoes and small grain), the manure applied to the clover sod for corn will be in excellent condition for the potatoes the following year. Treat all seed to destroy scab germs that may be on it, thus holding this trouble in check as far as you can. If you grow potatoes with nearly level culture (always the best way in a dry season, and as good in a wet one on drained land), plant in drills. If you plant in hills, you must hill up or they will grow out of ground and crack ground open and be injured in quality. If you want potatoes perfect in quality (snowy white inside), never let them be exposed to any light at all from the time they set until you eat them, so far as is possible. Keep them where it is absolutely dark. Those who sell to consumers or to local retail dealers may well make a note of this point; and also it will pay them to grow only those varieties that are choice to eat. Much of our money was made in this way. I have sold 1,000 bushels of potatoes to a grocer in the city at one time for 15 cents a bushel above market price. First, I produced something choice, way above the ordinary, and then I let folks know what I had. After trying them and finding that they could depend on their being No. 1, always, they readily paid me my price.

Fertilizing Self-Sterile Grapes.

By. Prof. S. A. Beach.

Not long ago a letter was received at the Geneva Experiment Station from a grape grower near Seneca Lake, in which the writer says:

> "I have some Wyomings and they don't bear well, and I have been grafting some of them with other varieties. They make good, strong, healthy stock to graft on. I want to get a few of some good early varieties. Is the Croton a good bearer? Does it cluster well? Do you know anything of the Alexander Winter, its color, quality or any other particulars?"

Such inquiries serve as a very good introduction to the subject—"Fertilizing Self-Sterile Grapes."

Similar questions in one form or another may rise in any community where American grapes are cultivated. Although they may vary in detail, sometimes one variety causing disappointment and sometimes another, they are frequently similar in their primary significance in that the fundamental cause of their trouble lies in the inability of the variety properly to fertilize itself. Such is the case with the Wyoming, which this correspondent is grafting over to other kinds. The Wyoming usually fails to set any fruit, unless it is fertilized by some other variety, as does also the Alexander Winter referred to. These are in this particular, representative of a large class of American grapes, many of which rank very high in flavor and quality, and when well-formed clusters can be produced are remarkably attractive in appearance, but unable to fertilize themselves they are unreliable croppers, unless cross-fertilized with some other variety. The Croton, to which our correspondent refers, on the other hand, produces well-filled clusters without the aid of any other variety. In this respect it is representative of another large class, including many of the varieties which have proved most generally successful in commercial vineyards.

A year ago the State Agricultural Experiment Station at Geneva, N. Y., published Bulletin No. 157 on the "Self-fertility of the Grape," in which each of the 169 cultivated American varieties was classified according to its ability to set fruit of itself. The following pages from this bulletin contain the classified lists just mentioned:

In this classification the varieties are arranged in four classes, according to the average character of the clusters which have developed from covered blossoms on vines in apparently normal condition. In cases where there is doubt as to whether the vine was in proper condition for the test the name is followed by a question mark, to indicate that the classification is doubtful.

Class 1 includes varieties which when self-fertilized have formed none but perfect clusters, and those with which the clusters have varied from perfect to somewhat loose.

Class 2 includes varieties which when self-fertilized have on the average formed marketable, although not compact, clusters.

Class 3 includes varieties which when self-fertilized have on the average produced clusters too loose to be marketable. This class has a wide range. It extends from the varieties in Class 2, with clusters not too loose to be marketable, to Class 4 which includes the self-sterile sorts. There are varieties in this class which have on the average produced self-fertilized clusters nearly compact enough to be marketable, some being compact but others being loose. At the lower limits of the class are found varieties which usually fail to produce fruit on covered clusters but, which have occasionally borne a few scattering fruits when the clusters are covered.

Class 4 includes those varieties which have not produced any fruit on covered clusters.

Classification According to Self-Fertility.*

CLASS 1.—CLUSTERS PERFECT OR VARYING FROM PERFECT TO SOMEWHAT LOOSE.

Ambrosia,
Antoinette,
Berckmans,
Bertha,
Columbian Imperial,
Cottage,
Croton,
Delaware,†
Diamond,
Diana,
Early Golden,
Etta,
Herald,
Hopkins,
Janesville,
Lady Washington,
Leavenworth,
Lucile,
Lutie,†
Mabel,
Marvin Seedling White,
Mary Favorite,
Mathilde,
Metternich,
Monroe,
Moore's Early,
Niagara,†
Opal,
Poughkeepsie,
Pockington,
Profitable,
Prentiss,
Rochester,
Rutland,
Senasqua,
Shelby,
Telegraph,
Winchell,†
Worden.†

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*This clasification is here modified to include the changes which are necessitated by the investigations of 1899.

†Previous records confirmed by 1899 tests.

Class 2.—Clusters Marketable; Moderately Compact or Loose.

Agawam,
Alice,
Arkansaw,
Bailey,
Big B. Con.,
Big Extra,
Brilliant,
Brown,
Burrows No. 42c.,
Carman,
Catawba,§
Caywood No. 50,
Centennial,
Champion (Cortland),
Chandler,
Chautauqua,
Clinton,
Colerain,
Concord,
Dr. Collier,
Duchess,
Early Market,
Early Ohio,
Early Victor,
Edmeston No. 1,
Elsinburg,
Elvira,
Empire State,
Esther,
Fern Munson,
Glenfeld,
Golden Grain,
Hartford,
Highland,
Hopican,
Illinois City,
Iona,
Isabella,
Isabella Seedling,
Jefferson,
Jessica,
Lady,
Leader,
Lindmar,
Little Blue,
Livingston,
Marie Louise,
Mills,
Missouri Riesling,
Nectar,‡
Norfolk,
Olita,
Paradox,
Paragon,
Perkins,
Rockwood,
Roger's No. 13,
Roger's No. 24,
Roger's No. 32,
Rommel,
Shull No. 2,
Standard,
Triumph,
Ulster,
Victoria,
Wheaton,
Witt.

Class 3.—Clusters Unmarketable.*

Adirondack,
Alexander Winter,
Amber Queen,
Aminia,
Beagle,
Big Hope,
Brighton,
Canada,
Canonicus,
Daisy,
Denison,
Dracut Amber,
Eaton,
Eumelan,
Geneva,
Gold Dust,
Hayes,
Hercules,
Lindley,
Marion,
Noah,
Northern Muscadine, (?)
Norwood,
Pearl,
Roenbeck,
Ross (Gov.),†
Thompson No. 5,
Thompson No. 7,
Vergennes,
Woodruff,
Wyoming.

Class 4.—Self-Sterile; no Fruit Develops on Covered Clusters.*

Aleda,
Amber, (?)
America,
Barry,
Black Eagle,
Blanco,
Burnet,
Clevener,
Creveling,
Dr. Hexamer,
Eldorado,
Elvibach,
Essex,
Faith, (?)
Gaertner,
Grein Golden,
Herbert,§
Jewel,
Juno,
Massasoit,
Maxatawney, (?)
Merrimack,§
Montefiore,
Oneida,
Red Bird,
Red Eagle,
Requa,
Rogers No. 5.
Roscoe,
Rustler,
Salem,
White Jewel.

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*In cases where the vines were not in good condition throughout the test the classification is marked questionable.

†Further testing may show that Governor Ross belongs to class 2.

‡Three self-fertilized clusters in 1899 averaged 90 on scale of 100.

§See pointer above.

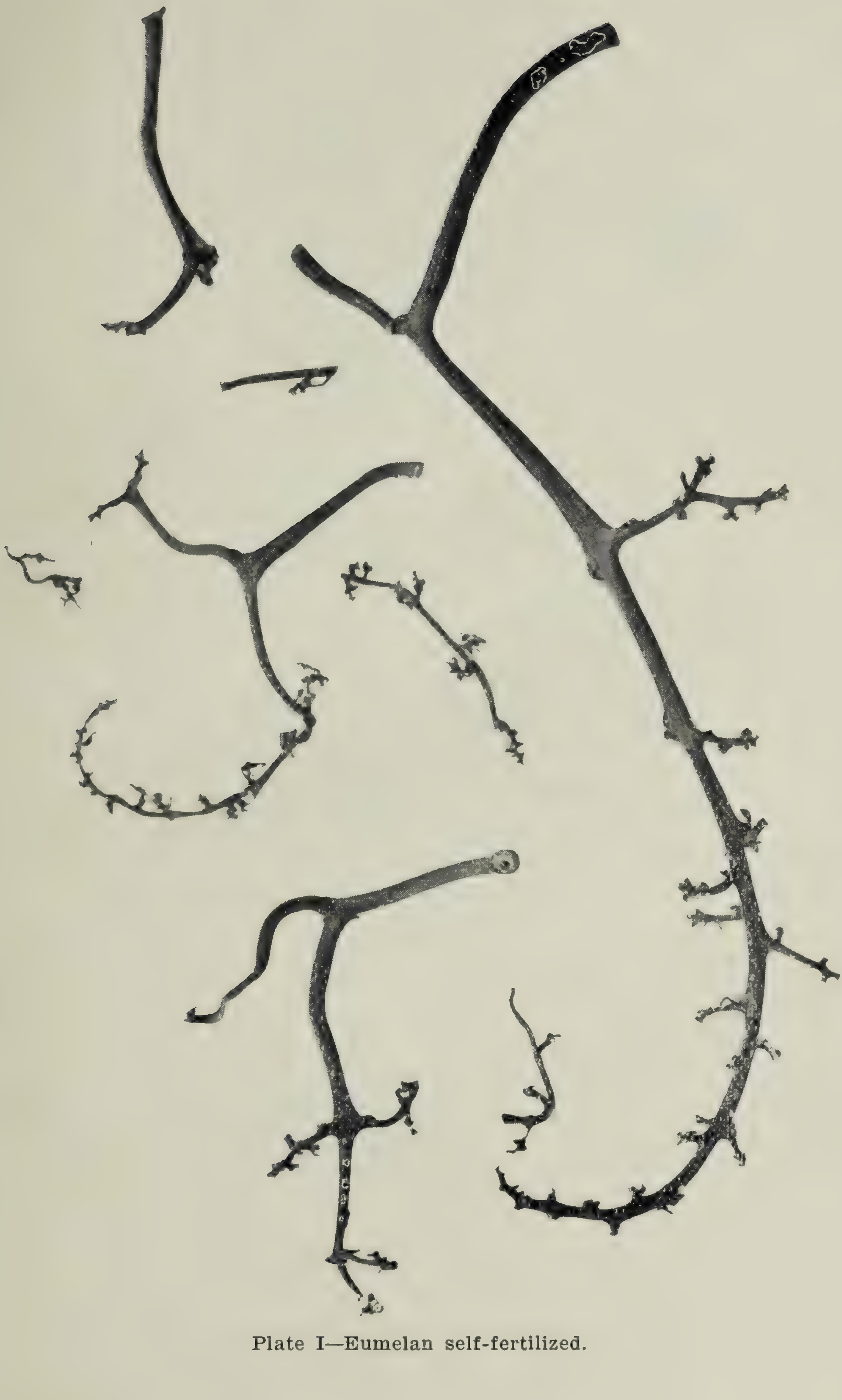


Plate I—Eumelan self-fertilized.

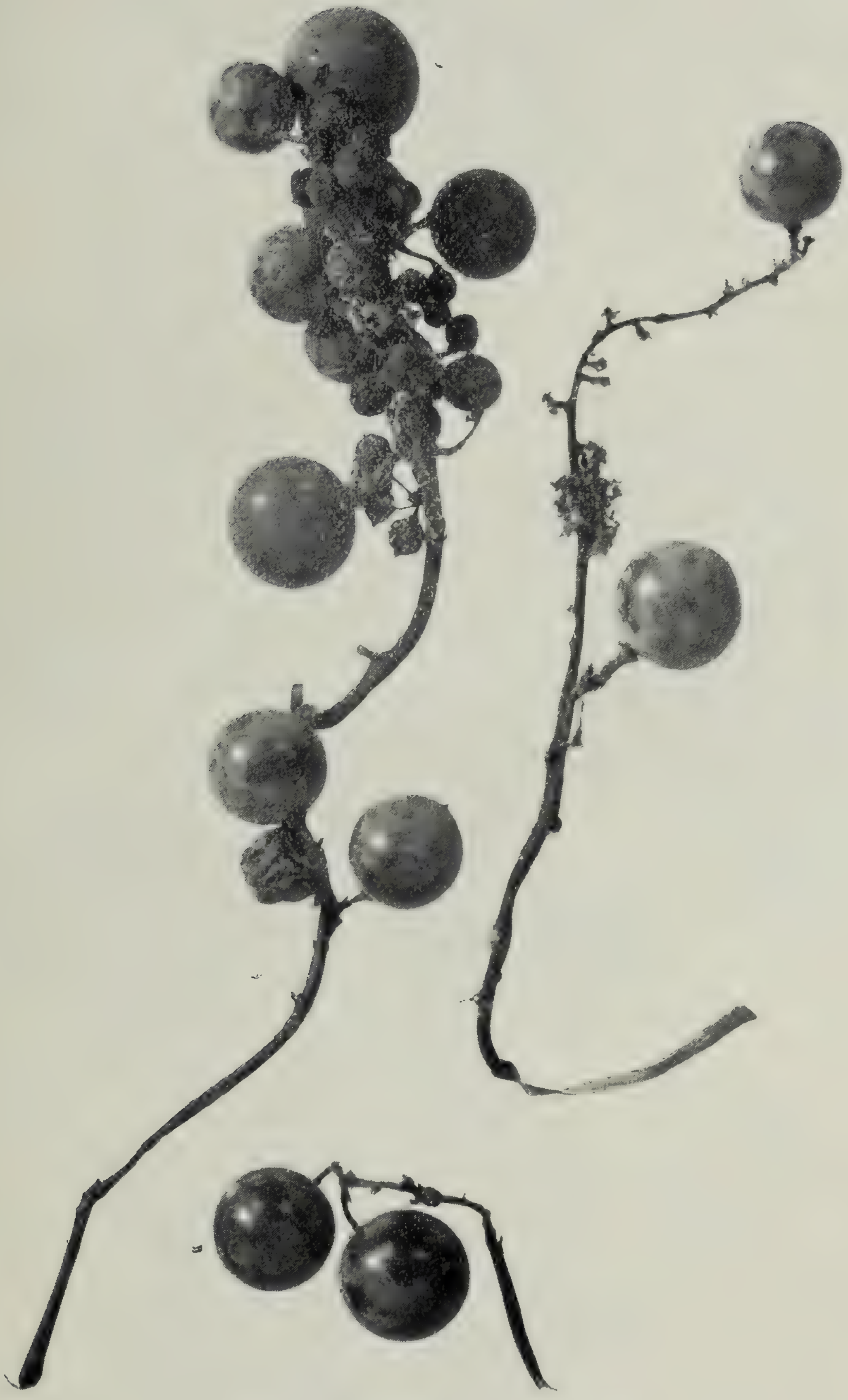


Plate II—Brighton self-fertilized.

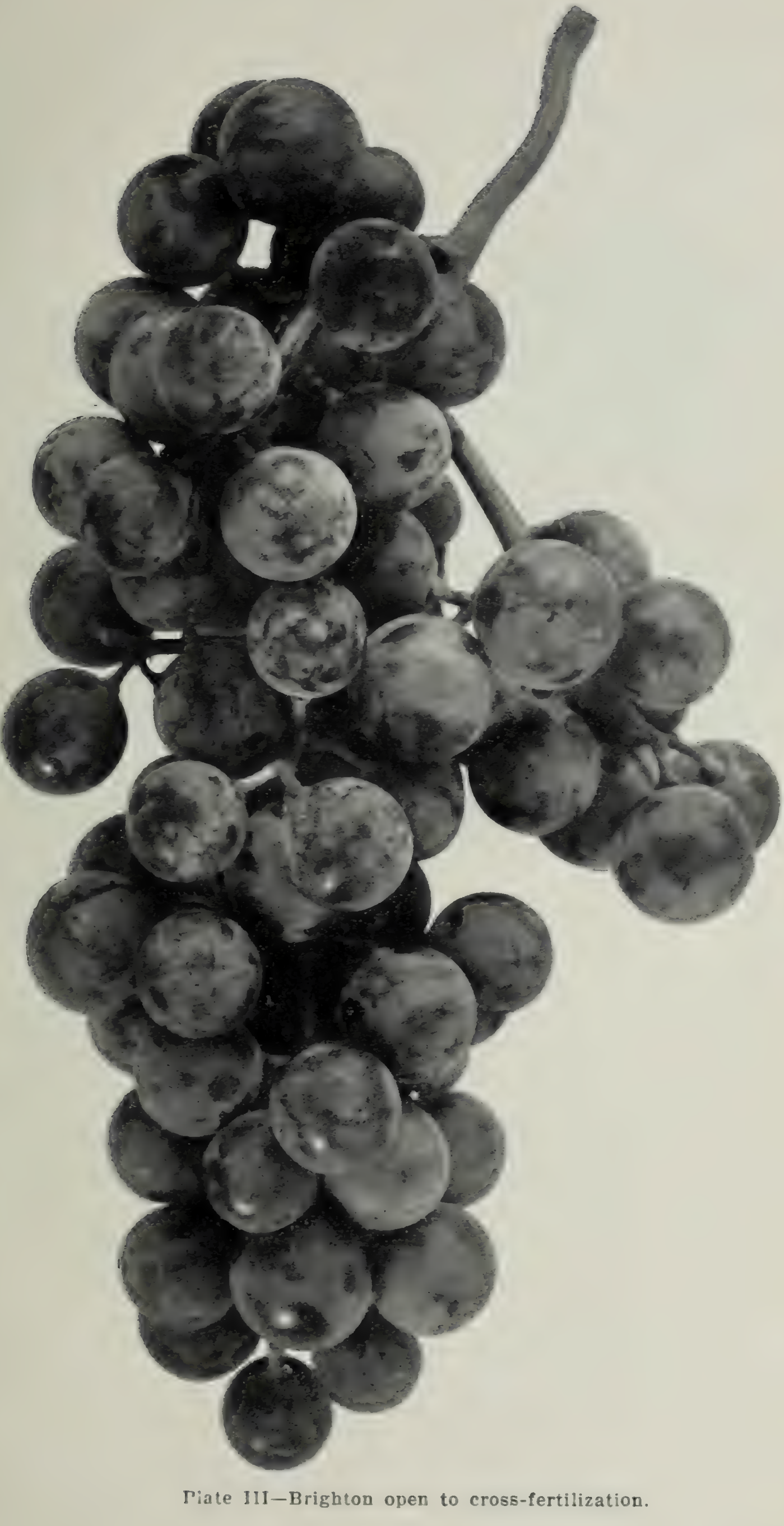


Plate III—Brighton open to cross-fertilization.

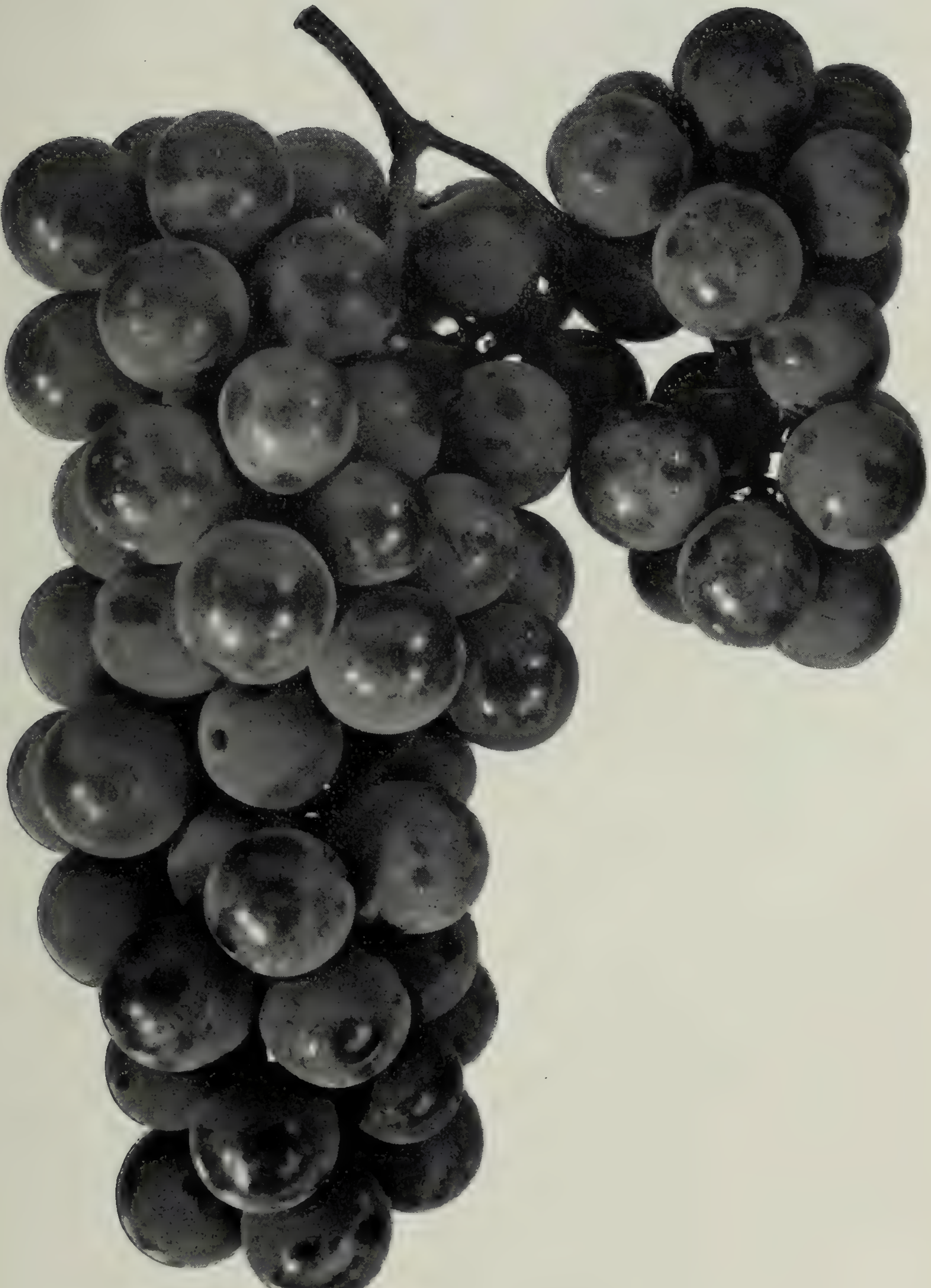


Plate IV—Diamond self-fertilized.

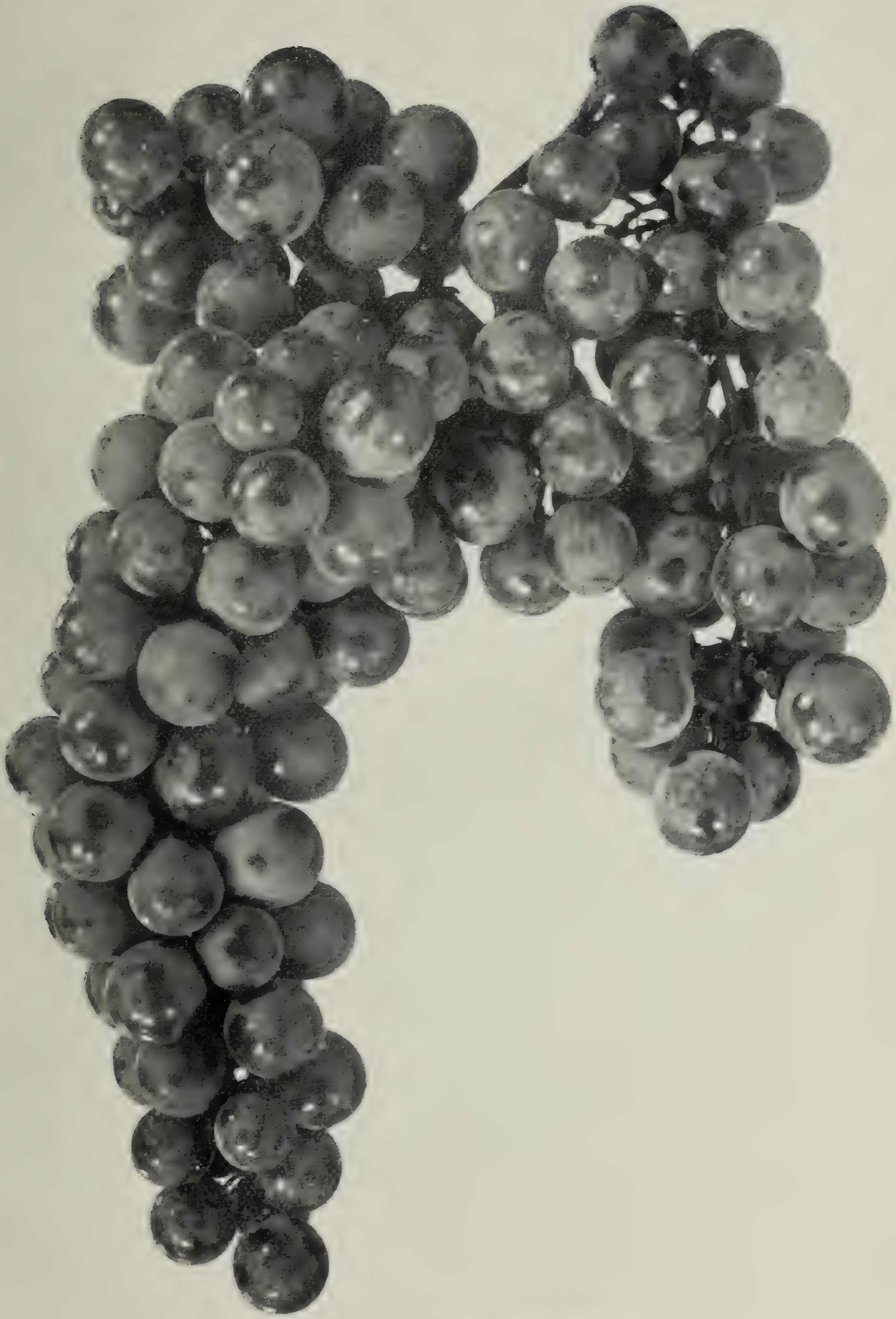


Plate V—Duchess self-fertilized.

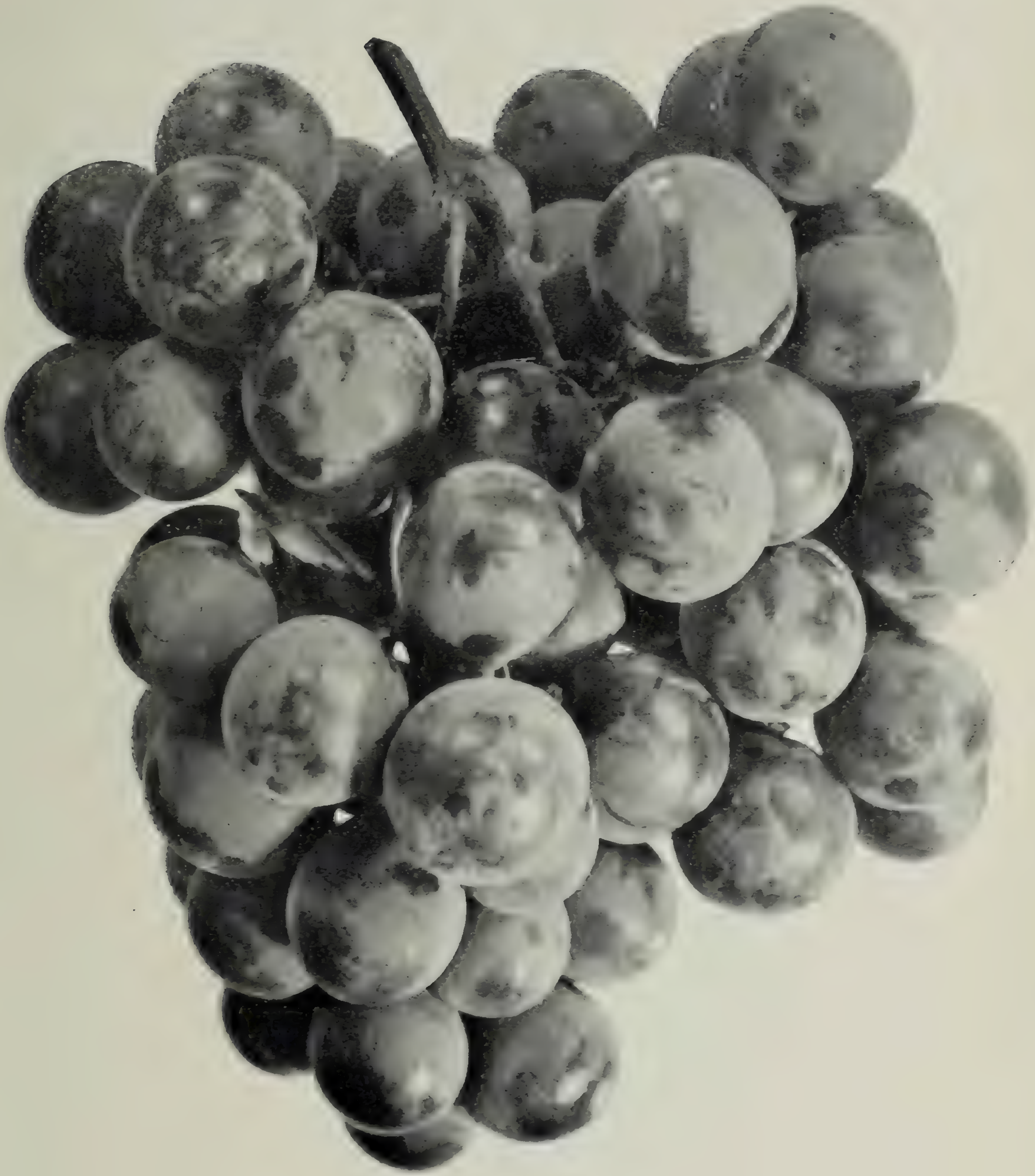


Plate VI—Herbert.

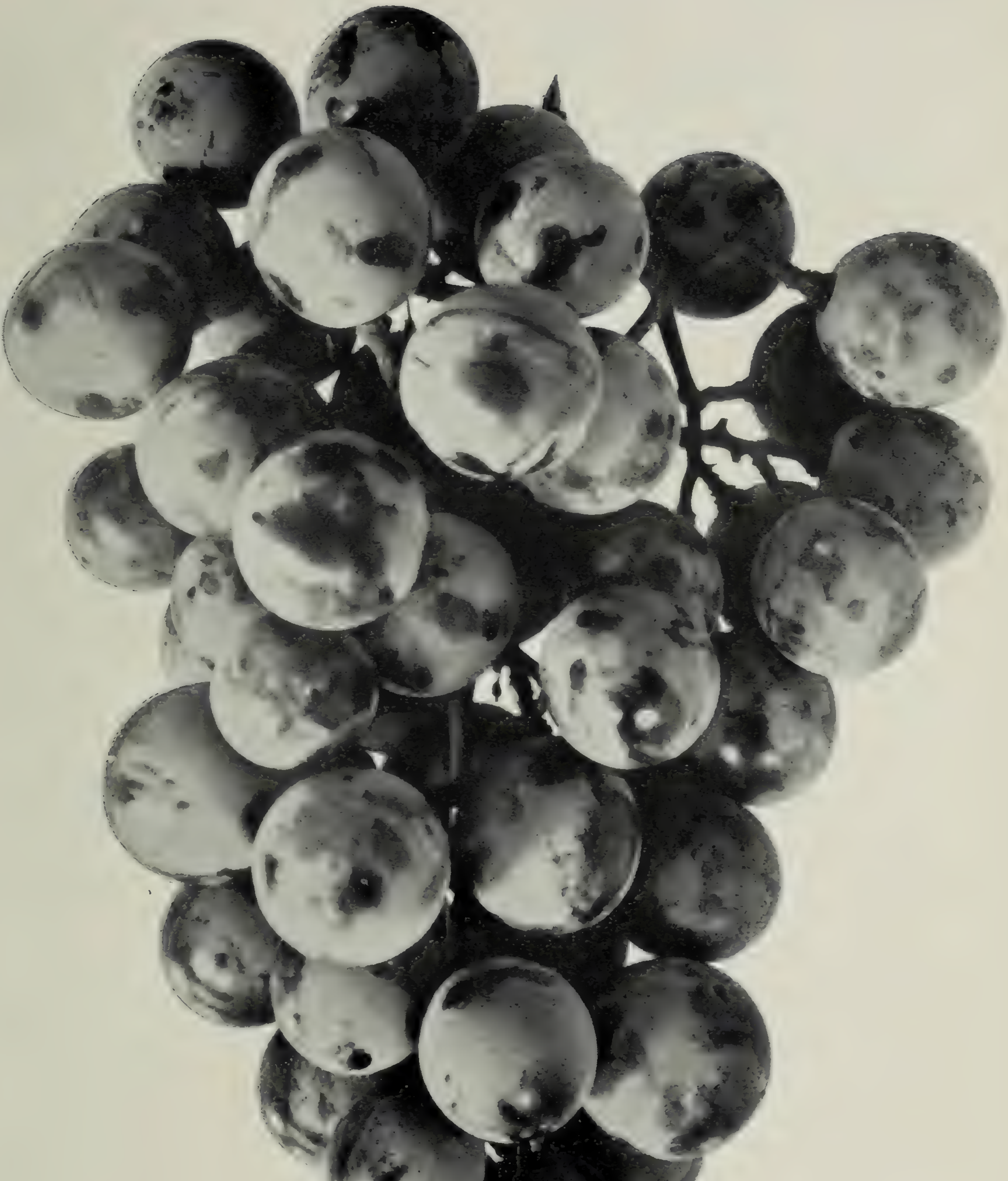


Plate VII—Barry.

Varieties Which Should Not Be Planted Alone.

These investigations have a practical bearing both on the selection of varieties and on their arrangement when planted. The self-sterile kinds cannot be expected to set fruit when they stand alone. Plate 1 shows what was left of covered Eumelan clusters at the time the fruit ripened on the uncovered clusters. It is seen that not a fruit developed when the Eumelan was compelled to depend on itself for setting fruit. Herbert and Barry likewise fail to fruit when dependent on their own blossoms for pollination. Brighton does a little better. The best results which its covered clusters gave in these investigations are the three clusters shown in Plate II. But self-sterile varieties may produce well-formed clusters when located near enough to other kinds of grapes so that cross pollination can occur. The clusters of Herbert and Barry, shown in Plates VI and VII, and that of Brighton, shown in Plate III, were borne on vines which were located favorably for cross pollination.

The varieties which are listed in Class 3 have generally developed clusters imperfectly filled and unmarketable and those named in Class 4 have failed to develop any fruit whenever cross pollination has been prevented. If these varieties are planted at all they should be set close to other varieties, which bloom at the same time, so as to provide for cross pollination.

The varieties which are named in Classes 1 and 2 produce well-formed clusters of themselves. The covered clusters of Duchess and Diamond, illustrated in Plates IV and V, show what perfect clusters may develop on varieties in these classes when the blossoms are self-pollinated. The varieties named in Classes 1 and 2 may therefore be planted alone without reference to cross pollination.

Explanation of Plates.

Plate I. Eumelan self-fertilized.
Plate II. Brighton self-fertilized.
Plate III. Brighton open to cross pollination (reduced one-third).
Plate IV. Diamond self-fertilized (reduced one-third).
Plate V. Duchess self-fertilized (reduced nearly one-third).
Plate VI. Herbert (reduced nearly one-half).
Plate VII. Barry (reduced nearly one-half).

After Bulletin 157 was issued, inquiries came to the station from various sources, bringing up the question whether one kind of grape was any better fertilizer for the self-sterile kinds than another, or whether all that was necessary to provide for the proper fertilizing of a self-sterile kind was simply to plant next to it a variety which came into bloom with it. For the purpose of gaining some information on this subject investigations were begun which, in 1899, included tests in fertilizing 12 nearly or quite self-sterile kinds with pollen of various varieties, some of which were self-sterile.

Methods of Making Tests.

All clusters were covered with bags before the blossoms opened, to keep away the insects, which might otherwise visit the flowers and bring with them the pollen of other varieties. This was done with the clusters which were to receive the pollen and with those which were to furnish the pollen also. When the clusters were in bloom the bags were opened and the blossoms brushed with clusters taken from the variety which had been chosen to furnish the pollen for that particular test. The bag was then immediately closed and properly labeled. It was left undisturbed till after the vines had gone out of bloom, after which the results of the tests were recorded. When the fruit was ripe it was gathered and each cluster rated on the scale of 100, to show how well filled it was with fruit, 100 representing a perfectly formed cluster.

Some of the results are summarized briefly in the following paragraphs:

Aminia is practically self-sterile. When it was used to pollinate Brighton the clusters averaged 0.3 on a scale of 100 for a perfect cluster. When used to pollinate Wyoming the average rating was 2. This indicates that Aminia is practically worthless as a fertilizer for self-sterile sorts. When Brighton and Wyoming were pollinated with strongly self-fertile kinds like Catawba and Niagara, good clusters of fruit were produced. Black Eagle, as far as tested, has proved self-sterile. It was used to pollinate the self-sterile Barry and the practically self-sterile Eumelan, but no fruit resulted. Brighton is practically self-sterile, but occasionally it produces a few fruits when self-pollinated. (See Plate II.) It was used to pollinate the following varieties which are self-sterile, or nearly so (the average rating in each case follows the name of the variety): Aminia, 1.7; Black Eagle, 0; Eldorado, 0; Herbert, 0; Lindley, 4; Merrimack, 8.8; Salem, 0; Wyoming, 12. Catawba has proved to be strongly self-fertile in the tests of its self-fertility which I have made. It was used to pollinate the following varieties, which are self-sterile or nearly so (the average rating follows the name of the variety): Aminia, 89; Brighton, 74.4 and 80; Eldorado, 0.5; Herbert, 100; Lindley, 63; Merrimack, 91.7; Salem, 4; Wyoming, 100. Herbert is self-sterile. When it was used to pollinate the self-sterile Eldorado and Salem, no fruit was produced. When used on the nearly self-sterile Brighton the average rating was 28. Lindley, so far as tested, has proved self-sterile. It was used to pollinate the following kinds, which are self-sterile, or nearly so (the average rating in each case following the name): Brighton, 2; Eldorado, 0; Herbert, 0; Merrimack, 32; Salem, 0.4. Merrimack is self-sterile. When used to pollinate the self-sterile Lindley, Herbert and Salem, no fruit resulted. When used on the partly self-sterile Brighton, all clusters but one failed to fruit, and that was well filled. This test should be verified by further work. Niagara is strongly self-sterile. It was used to pollinate the following varieties, which are self-sterile, or nearly so (the average rating after each name): Aminia, 80; Brighton, 85.7 and 52.5; Eldorado, 76; Herbert, 98.8; Lindley, 77; Merrimack, 96.3; Salem, 98.

Without giving further particulars, it will be sufficient to say that without other tests which were made the results in general were similar to those which have been given. The use of self-sterile, or practically self-sterile, grapes for fertilizers for other self-sterile, or nearly self-sterile kinds, resulted in failure. When varieties which are strongly self-sterile, like Catawba, Niagara and Worden, were used to pollinate these self-sterile sorts, generally good clusters of grapes resulted.

In conclusion, a word of caution as to the significance of the average ratings which have been given in the above account of these investigations. They cannot be taken as showing accurately the ability of the variety to fertilize the other varieties upon which its pollen was tried, because the clusters were not always in full bloom when pollinating was done. Nevertheless, in a general way, the results may be taken as signifying that self-sterile sorts are practically worthless as fertilizers for other self-sterile varieties, and that it is best to select as fertilizers for self-sterile grapes strongly self-fertile kinds which bloom at the right season. For a more complete account of these investigations consult Bulletin 169 of the State Experiment Station, Geneva, N. Y.

Some Practical Points in Bean-Growing.

By J. E. Wilson, Linwood, N. Y.

Beans seem more particular in requirements of soil and climate than most farm crops. The area devoted to cultivation is quite limited, western New York and Michigan furnishing the greater part of the domestic crop. Their cultivation has necessarily been developed in the field by practical experience, and methods here outlined are employed by our most successful bean-growers. Beans do best on rather heavy soil if well drained, naturally or otherwise. They are very sensitive to an excess of water in the ground. Good corn land will grow good beans, generally. They will not thrive on light or sandy soils unless well manured. A clover sod makes the best seed bed. A corn stubble manured the year previous for corn, or an old sod, fall plowed, will give good results. They pay well for stable manure, especially if applied the fall or winter before on sod. Plow the ground in spring as soon as dry enough to work mellow, usually the early part of May with us, plowing deep, eight to ten inches, if the soil will admit of it, and do a thorough job, as careless plowing will materially reduce yield. As soon as plowed, ground is rolled and thoroughly fitted, and then worked over about once a week until planting time. It should be cultivated twice or more, during this time, with a large-toothed cultivator, working it from four to six inches deep. This deep working by large-toothed implements, thoroughly stirring the soil and bringing new particles together, seems to bring about some chemical action, which, while it may not be understood, has proved beneficial. If it is a dry spring, only shallow working should be given for a few days previous to planting, that the moisture may rise near enough the surface to germinate seed. This thorough working for a month or six weeks will make a mellow and moderately firm seed bed to the depth of four or five inches, will liberate a large amount of plant food and destroy most of the weed seed.

The time of planting will depend somewhat on the variety grown. The Marrow pea, perhaps more largely grown than any other, is planted anywhere from May 25th to June 20th, usually about June 10th or 12th. The Marrow, Yellow Eye, Red Kidney and others of the larger varieties, are planted a week or ten days earlier. About three pecks of pea beans, and from four to five pecks of the large varieties, per acre are planted in drills twenty-eight inches apart. Most growers use common grain drills for this purpose, stopping the hoes not needed. Care must be taken not to get the seed too deep; if the ground is in good condition, one inch is plenty deep. If they do not come up quickly they will not make a full crop. If your soil responds to fertilizers, an application of from 100 to 250 pound of a mineral fertilizer will increase the yield and help ripen the crop evenly and earlier—two important points.

A few days after planting, and before beans come up, go over ground with weeder. This breaks all crust, destroys what weeds may have sprouted and levels ground, so that crop can be cultivated sooner. Just as soon as they are large enough, the cultivator and weeder is started, cutting as close to the row as possible, the first time with the cultivator. The weeder is used in connection with the cultivator as long as practicable, going over the beans once a week or every ten days until ripe, or until vines fill the row. After first time over, cultivation should not be over an inch or inch and a half deep and ground kept as near level as possible. With proper points for the cultivator this can be very easily done.

In raising a crop of beans it must be borne in mind that they make their entire growth in about three months, and that in the dryest and hottest part of the year, and in ordinary seasons, a large part of the moisture which they need will have to be held in the ground from the spring rain. Hence, the necessity of early and deep plowing and the thorough preparation of the soil before planting, as a deep, thoroughly-prepared soil will hold more moisture than a shallow and cloddy one. Frequent cultivating breaks any crust and checks evaporation, leaving most of the moisture for the use of the plant. In plowing deep and cultivating shallow you give the largest amount of root room for the plant, giving them every chance to produce a full crop.

As soon as pods are ripe, and before dry enough to shell, they are harvested by a machine made especially for this purpose. Two knives, running about an inch below the surface, pull the beans by the roots, two rows at a time, the knives set at proper angle, to bring rows together. They are then thrown into bunches with forks to cure, two or three of the double rows being thrown into one, leaving room to drive a wagon to haul to barn. They are mostly threshed by a machine built for the purpose, somewhat similar to our grain threshers and requiring the same power to run it. Where only small lots are raised, they are often tread out on the barn floor by horses, in frosty weather. Produce dealers take them as they come from the machine and run them through screens, after which they are picked over by hand, and stones, earth and damaged beans removed. Dealers buy them by the bushel (62 pounds) and deduct five cents for each pound wasted in picking. This is often a serious shrinkage to the grower. The price paid here (Linwood, N. Y.) for hand-picked beans is about 35 cents below New York quotations.

Beans grown as above outlined, on soil adapted to them, in a favorable year ought to make a crop of 18 to 20 bushels per acre, although this is considerably above average. They pay as well, perhaps, on an average as other common farm crops. The fodder makes excellent feed for live-stock; sheep, especially, are very fond of it and will thrive better on it than on hay.

Twelve Years' Experience in Spraying.

By Edward Van Alstyne, Kinderhook, N. Y.

The question is often asked, "What is the use of all this spraying?" Is it necessary? A few years ago we heard nothing of these various insects and diseases. Is it a notion gotten up by the people who have something to sell, makers of spraying apparatus or dealers in chemicals? Are these new troubles? I answer by saying that most of these troubles are not new. We have been increasing our plantings of fruit trees and plants, and have thus furnished excellent food, as well as good breeding ground, for various pests, something more suited to their needs, as well as more plentiful than the wild plants, on which they originally subsisted. Fruit plantations multiply; so do these troubles. As we increase traffic with the whole world we continue to bring in new pests and diseases. Dr. Howard says that of the 75 insects most injurious to fruits, 37 are of foreign origin. Cold, hard facts, but we may as well accept them first as last. He who will not adapt himself to these changed conditions will surely be left in the rear of the procession of progressive fruit-growers. The man who will control conditions is the man who will be paid for fruit-growing as never before.

I do not entertain the foolish idea that spraying is the only thing necessary to make fruit-growing successful. Spraying will not fertilize or cultivate the soil, or prune trees. You have commenced at the wrong end if you think spraying is all that is necessary. If I must choose between spraying, fertilizing and cultivating, I shall abandon spraying, and cultivate and fertilize. If growers think they can starve trees by lack of fertility and cultivation, and once in three or four years cut out the summer's firewood from the trees, and call it pruning, and then go to work and spray and expect satisfactory results, they will be sadly disappointed, and, as many have done before, condemn spraying. After we have fertilized, cultivated and pruned, if we want perfect fruit and greatest success, we must spray, and spray thoroughly and intelligently. I want to emphasize the foregoing facts. Twelve years ago I was convinced, after giving my orchard the best care that I could, that insects and disease were increasing, and when first I heard spraying talked of, I thought it, as many have since, a great disaster, and felt that I might as well quit the business first as last. In the fall of 1886 I sold my winter apples for $2.25 per barrel, net, for first-class fruit. After careful picking and grading we had 100 barrels of rejected apples on account of worms and scab. There were about 25 barrels of windfalls beside, out of 300 barrels shipped to market. If they had been perfect they would have brought over $250, and they were worth $25 or $30 for cider. I reasoned that if spraying would do what people said it would, it was certainly a good thing for me to try. I found that it would not only keep fruit free from worms and scab, but would greatly lessen the number of windfalls. The first year's spraying is often disappointing. Many start in to spray with very little knowledge of what they are spraying for, or how to do the work. They do not do the work at the right time, nor thoroughly, and they are fighting insects and diseases that are well established; hence failure to accomplish what was expected. Diseases and insects multiply year after year, and we certainly cannot expect to destroy them by one year's work. Insects do not start out to commit suicide for our benefit, and will not eat the poisoned leaves if they can get those that are free from it. Therefore, all the foliage must be covered and kept so, if we expect good results. The man who gets best results from spraying is the one who sprays annually, at the right time and for a definite purpose, covering the whole tree with the mixture. I would not spray a tree that had no fruit on it as many times as one that was bearing, but I would spray it once or more, for insect and disease germs are there and must be held in check, less they multiply.

The man who sprays as indicated need fear no new leaf-eating insects or disease that Bordeaux will prevent. I asked a friend of mine in Orleans county if he did not dread the canker-worm getting into his orchard, as it was all through the orchards in that section. I have heard Prof. Bailey say that he could actually hear them eat. He replied: "My trees are annually covered with poison, and I have no fear of the canker-worm." That was several years ago, and his orchard is as free from canker-worms as it was then. I have seen the time when we took 47 large nests of the tent caterpillar from a single tree. For five years I have not had to remove a nest from my large orchards where we have sprayed, while a young one not in bearing and never sprayed we had to go through twice last summer and remove the nests by hand. Why? Because a thorough system of spraying had held them in check and destroyed them.

Spraying is working by faith, which is a great deal harder than working by sight. Here is a little fungus, or insect, so small that few here have ever seen it. We have to take some one's word for what it is, where it is, and what will destroy it. To him who has never sprayed I say, don't do it unless you are thoroughly persuaded in your own mind that it is the proper thing to do. Then know what particular object you are going to spray, the life-history of the insect, or nature of the disease, with what or how can you prevent or destroy it. I believe that only to the man who so acts will success in this direction come.

To illustrate, take the scab fungi. One scientific man says that they are so small they cannot be seen with the naked eye, but are present in our orchards in a latent state, ready to develop under favorable conditions, such as high temperature and moist atmosphere, during which they spread and multiply with enormous rapidity. Bordeaux mixture applied over the whole tree will prevent their spread, as the fungi cannot live when they come in contact with the mixture. This means the trunk, limbs, twigs, leaves and fruit. Simply to throw a little combination of water, vitriol, lime and poison at the tree after the fungus has spread, will do but little good, while properly made and applied it will not only give us clean, bright fruit, but a vigorous growth of healthy foliage, which means more fruit, a stronger tree and fruit that will keep much longer than that from a tree with poor foliage. This I have found more than once.

After years of experience with the Bordeaux mixture I have come to regard it almost with veneration, and had I to choose between it and insecticides I should without hesitation select Bordeaux. Its value depends largely on its being properly made. Dr. Sturgis has given us much valuable information along this line, and I would advise a study of the bulletin on this subject issued by the Vermont Experiment Station. I have not time to go into detail, only to say that by putting six pounds of vitriol with half of 50 gallons of water, and four pounds of lime with the other half, and then combining these two weak solutions, will give a mixture that will stay in suspension and not clog the muzzle and will spread easily and remain long on the trees. We always dissolve the vitriol and lime before hand, using as many gallons of water as we have pounds of material. A gallon then represents a pound and all figuring is done away with.

The insect that causes the most trouble is probably the codling moth, and while the egg may hatch anywhere on the fruit, it usually enters from the blossom end. If we spray just after the blossoms fall and the fruit stands upright the poison will be collected on the tops at the blossom end, is likely to be retained there for a long time, and pretty sure to be fatal to the worm before it enters the apple. This period when the apple is in this position with the petals open, may be longer or shorter according to the season, and varies with different varieties. It will be readily seen that each of us must watch his own orchard and the different varieties therein to know the proper time to apply the poison to get the most benefit.

There is a prevailing notion that the tree can be best sprayed when it is in full blossom. From the above it should be evident how false this is. Certainly nothing can be gained and much lost by spraying at this time. In addition, it will poison the bees, so necessary for proper pollen distribution. No one has any more right to destroy his neighbor's bees than his cattle. Instances are on record of the bees carrying the poison into the hives.

Do not think that I consider spraying an easy job. There is nothing connected with fruit-growing I dislike so much. When I have reached the end of the spraying season and put away the sprayer, I always feel like singing a Glory Halleluiah. It is not an easy thing to do, but it pays, and that is what we grow fruit for. We want profit as well as fun.

"How many times and when do you spray your apple trees?" Usually three times. First, just as the foliage starts, using Bordeaux and Paris green. I find this just as good as to spray earlier. Then after the blossoms fall, as noted above, and usually once more, about two weeks later, using Borbeaux and Paris green twice each. Last year I did not spray but twice. It was a dry season and the spray was retained on the trees, having little rain to wash it off. I have Bordeaux on my trees now (February) that was put on last May. Then, too, we had but little weather to develop fungi. Some years it may be necessary to spray four or five times. I use with Bordeaux mixture, half a pound of green or poison to 50 gallons of water; that is for apples and pears. With a good agitator I have never had it burn the foliage. It will take as much as this to kill the bud-moth and will kill tent caterpillars and other insects quicker, which is an item when a rain follows shortly after spraying.

I believe green arsenoid just as valuable as Paris green, and certainly much cheaper. It could be bought last season for 14 cents per pound. For those who are doing much work, white arsenic will be found cheaper still. This needs to be boiled with sal-soda, and while not a difficult job, a beginner had better use the green, as the simpler he can make the operation the better.

I find a good deal of the first spraying can be done best from the center of the trees. This I learned from spraying large elms for the elm-leaf nets. We put a pair of telegraph lineman's spurs on a man and sent him into a 50 or 60 foot tree with 40 feet of hose and 8 foot rod. Ordinarily a good, powerful hand pump, with a good agitator, will do the most practical and thorough work. Half-way spraying leaves plenty of uncovered foliage and fruit for insects and fungi to feed on. When the work is thoroughly done there is no choice for the insect but to eat and die. From 85 to 90 per cent. of fruit may be made absolutely perfect if the work is properly done.

To show the advantages brought about by the Bordeaux in giving vigorous foliage, I will site you an instance that happened a few years ago. My men ran out of Bordeaux in spraying the Greening trees, and as they were only short half a barrel, I told them to finish with green and water. The next spraying I helped to do myself, and came first to the side of the Greenings that the men had sprayed last. I at once noticed that the foliage was yellow and sickly looking, and as I had forgotten about the lack of Bordeaux I was planning to give them some increased fertility, but on coming back to the other side found the foliage as healthy as any in the orchard. Then I remembered that those were the trees, one side of which had no Bordeaux, showing the value of the Bordeaux where it is applied, and only there.

Now an illustration for the scab on fruit. I have a block of Newtown pippin trees standing below a hill, on rather heavy soil and too close together. These were thoroughly sprayed with Bordeaux three times and poison to test the value of the Bordeaux for the scab. I had in the same orchard three trees of the same variety on high ground in the outside row where they had plenty of light and air. All conditions most favorable to the development of the scab. These I left unsprayed. In spite of their favorable conditions two-thirds of the apples were so scabby as to be worthless, while the trees unfavorably located, but sprayed, looked as fair as oranges, and pronounced by the buyer the best he had ever seen.

One more illustration to show the effect in ridding fruit of insects. A few years ago I had strawberries in one orchard, and as the weather was very wet when we should have sprayed, the work was delayed. Fearing to injure the berries the orchard was left unsprayed. I sold my fruit that year, guaranteeing it perfect. That from the sprayed orchard sorted out only one barrel out of eleven (and those were good seconds that brought $1.50 per barrel) that were not absolutely perfect, while the unsprayed orchard, only separated from the other by a picket fence, yielded only two barrels out of three that could go under the guarantee. Besides, the ground was covered with windfalls, and in the first orchard hardly any had fallen.

I therefore conclude that spraying pays if done *intelligently at the right time*, and *thoroughly*, and if not done this way it had better not be attempted.

Injurious Insects and How to Control Them.

By E. P. Felt, D. Sc., State Entomologist, New York State Museum, University of the State of New York.

Before considering any of the forms which so frequently attract our notice through their depredations, I will mention briefly some of the beneficial species.

Beneficial insects.—There are many parasitic and predaceous forms which prey on injurious insects and are therefore beneficial. Examples of these may be found in the numerous ichneumon flies, some of which are important parasites, or in the predaceous ground beetles, bugs and others which boldly attack our pests. A little observation will soon enable the farmer to recognize these and he will then protect or at least avoid destroying them. Professor Kellogg, of California, records an instance where a well meaning correspondent destroyed a pint of beneficial lady bugs under the impression that he was killing the depredators on his rose bushes. Other species feed on noxious plants and thus indirectly benefit man by preventing these from becoming nuisances. Insects also render valuable aid as scavengers and the myriad forms inhabiting the soil undoubtedly do much toward reducing it to a more friable, fertile condition. They are also used to some extent for food by man and the honey bee supplies a most important article for the table. Insects are also fed to poultry, song birds and in nature undoubtedly constitute a valuable food for many fish. The silk worm supplies the material for an important fabric, the cochineal and lac insects, substances of considerable value in the arts. One of the most important beneficial functions of insects consists in fertilizing the blossoms of our fruit trees, that is, carrying the pollen from flower to flower. Without the aid of bees, wasps, certain flies and other insects, it would be impossible to obtain a full set of fruit without resorting to artificial fertilization. The enormous labor involved in this is easily understood and when we think of the number of trees and other plants that would have to be gone over and the relatively short time in which the work must be accomplished, our dependence upon insects is apparent. This emphasizes the wisdom of not spraying trees while in blossom. The spray wets the flowers, thus preventing the insects from working for a time, the poison used is apt to burn the tender parts of the flower, rendering fertilization impossible, and finally the bees themselves may be poisoned by visiting sprayed blossoms. They may even carry the poison home, kill the brood and contaminate the honey. There is also a state law prohibiting spraying trees while in bloom. So far as controlling insects is concerned, everything necessary can be accomplished by applications made either before or after blossoming time.

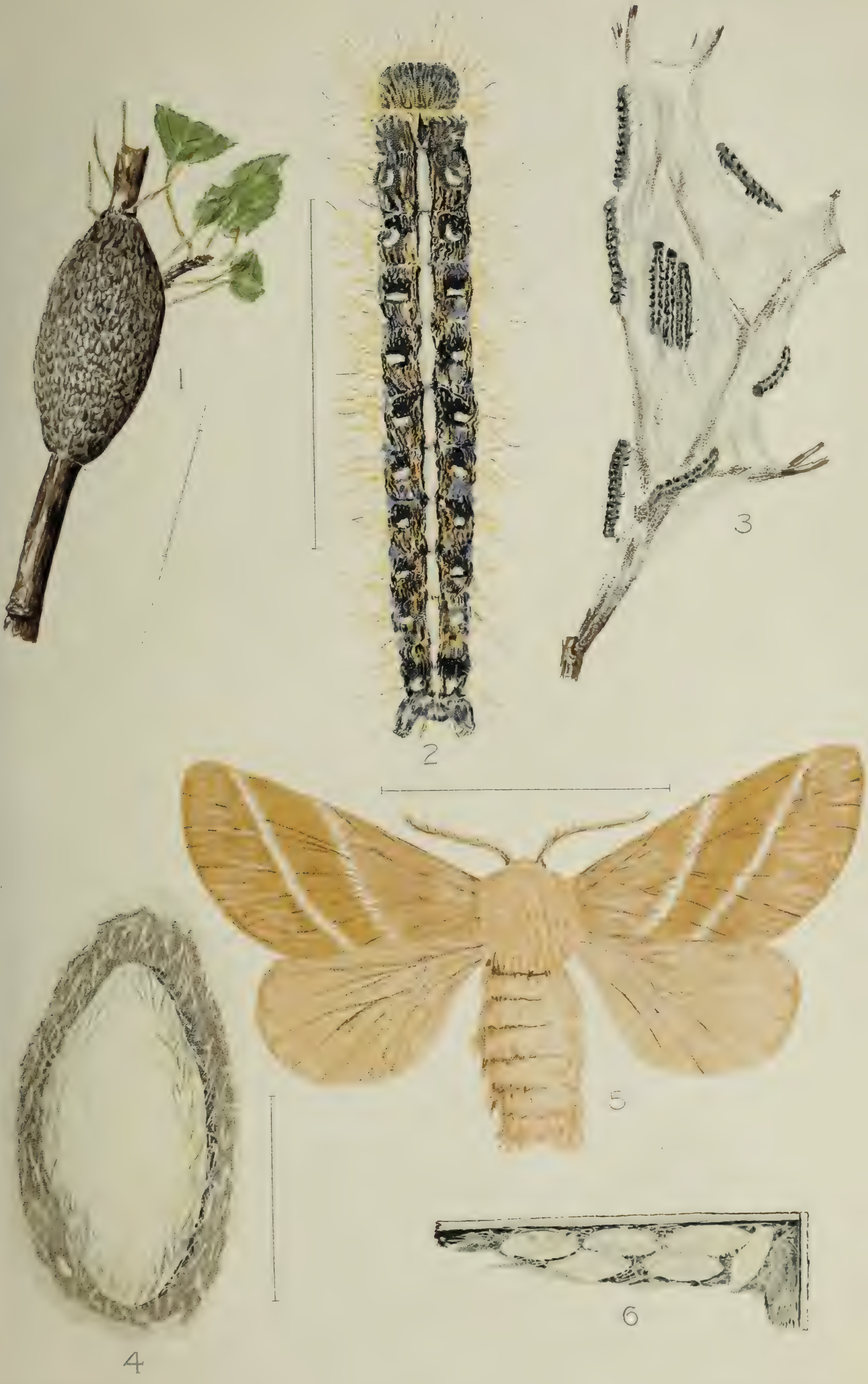
Losses caused by insects.—Many persons fail to realize the enormous losses caused by insects. The annual loss in the United States has been estimated at $400,000,000. Dr. C. H. Fernald, State Entomologist of Massachusetts, considers a loss through insect ravages of 10 per cent. of the value of a crop a conservative estimate. On this basis, the loss on cereals, potatoes and hay grown in New York State in 1898 would amount in round numbers to $7,000,000. Professor Slingerland, of Cornell University, estimates that the codling moth causes an annual loss in New York State of $2,500,000 on the apple crop and $500,000 on the pear crop, making a total for this insect of $3,000,000. An important point to remember in this connection is, that of 73 species regarded as of prime economic importance, that is each causing annually in the United States losses running into the hundreds of thousands of dollars, 37 are known to have been introduced, and the original home of six is still open to question. We may not be able to exclude insects from the country at large or from the state, but the individual farmer has it largely in his power to prevent certain species from obtaining a foothold on his farm. An orchard is grown not for the fruit it produces the year after it is set out, but for the crops ten to twenty-five years later; consequently it should always be some distance from the boundary lines, so that the owner may never be obliged to suffer through the carelessness or indifference of a neighbor. All trees and plants brought on a farm should be closely scrutinized and it would be a wise precaution to fumigate all such with hydrocyanic acid gas (as recommended on a following page) or else to buy only stock which has been so treated. If these precautions are taken, a man may reasonably expect to reap nearly full benefit from his efforts to keep his orchards free from injurious insects.

Number of injurious insects.—The number of injurious insects is so great that it is impossible to treat of all those worthy of notice. For example, 378 different species have already been listed as preying in some manner or other on the apple tree or its fruit, and while the majority of these can hardly be regarded injurious, as a rule, yet under unusually favorable circumstances almost any one of them might cause considerable damage. Before passing to the consideration of individual species, there are a few fundamental facts which should be emphasized.

Biting and sucking insects.—In a practical way we must distinguish between those insects which bite off and devour portions of their food and others which obtain their sustenance by sucking fluids from the underlying tissues. The work of the former class may easily be recognized by portions of a plant being eaten away. As a general rule such insects can be controlled by spraying with an arsenical preparation, provided the poison is placed where the insect must eat it or go hungry, and the success of the operation will be proportional to the plant surface covered. In short, when spraying with arsenical poisons aim to have the insecticide hit every portion of the plant liable to attack. The necessity of this is shown by the following: Last spring maple leaves were sprayed with several arsenical preparations. The variously treated leaves (after the spray had dried and the poison was therefore nearly invisible,) and some untreated ones were placed in separate jars and forest tent caterpillars placed with each lot. In spite of these precautions, the caterpillars on the sprayed foliage ate very little for from twelve to thirty-six hours while those on the untreated leaves fed most readily. The same results were repeatedly noticed with the elm leaf beetle. The more successful fruit-growers make a practice of spraying every year; first as the buds are opening, second, just after the petals have fallen and before the green calyx lobes have closed, and then about seven to ten days later. Such treatment should be amply sufficient to control all orchard pests which yield to arsenical poisons. If four ounces of Paris green or other arsenical preparation is added to fifty gallons of Bordeaux mixture, we have a very effective fungicide and insecticide combined, which is of special value for the first treatment. If spraying is undertaken, it most certainly should be continued year after year, because experience has demonstrated that it is far from wise to await the appearance of a pest in force before applying the remedy.

As the arsenites lie in small particles on the surface of the plant, it is evident that an insect drawing nourishment through a slender, thread-like beak or proboscis from the interior of the plant, would be unaffected by such poisons. We must therefore fight sucking insects by using substances which will kill when thrown on the insect. That is, use a contact insecticide like kerosene emulsion, whale oil soap solution, etc. Success with contact insecticides is proportional to the number of insects hit. Spray to cover the pests with the substance. Contact insecticides are to be used whenever insect injury is accompanied by a wilting or discoloring of the affected parts and there is no tissue eaten away. The foregoing are general rules which must frequently be modified to meet special cases.

Beware of frauds.—A word of warning in this connection may not be out of place. Beware of remedies for which great claims of one kind or another are made. There are now forty-six entomologists in the United States giving a large proportion of their time to the study of insects and methods of controlling them, and unless a remedy is advised by a well known authority, it will be



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Apple Tree Tent Caterpillar.

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well to go slow before trying it. One of the oldest fakes is plugging trees with sulphur or some other substance said to be taken up by the sap, thus rendering the foliage distasteful to insect pests. Such claims have no foundation and should not be heeded. Yet in 1896 or thereabout, as stated to me by Mr. E. Van Alstyne, such an agent appeared in Kinderhook, N. Y., charged two dollars for plugging a tree, took in about $50 and then departed, leaving an unpaid board bill.

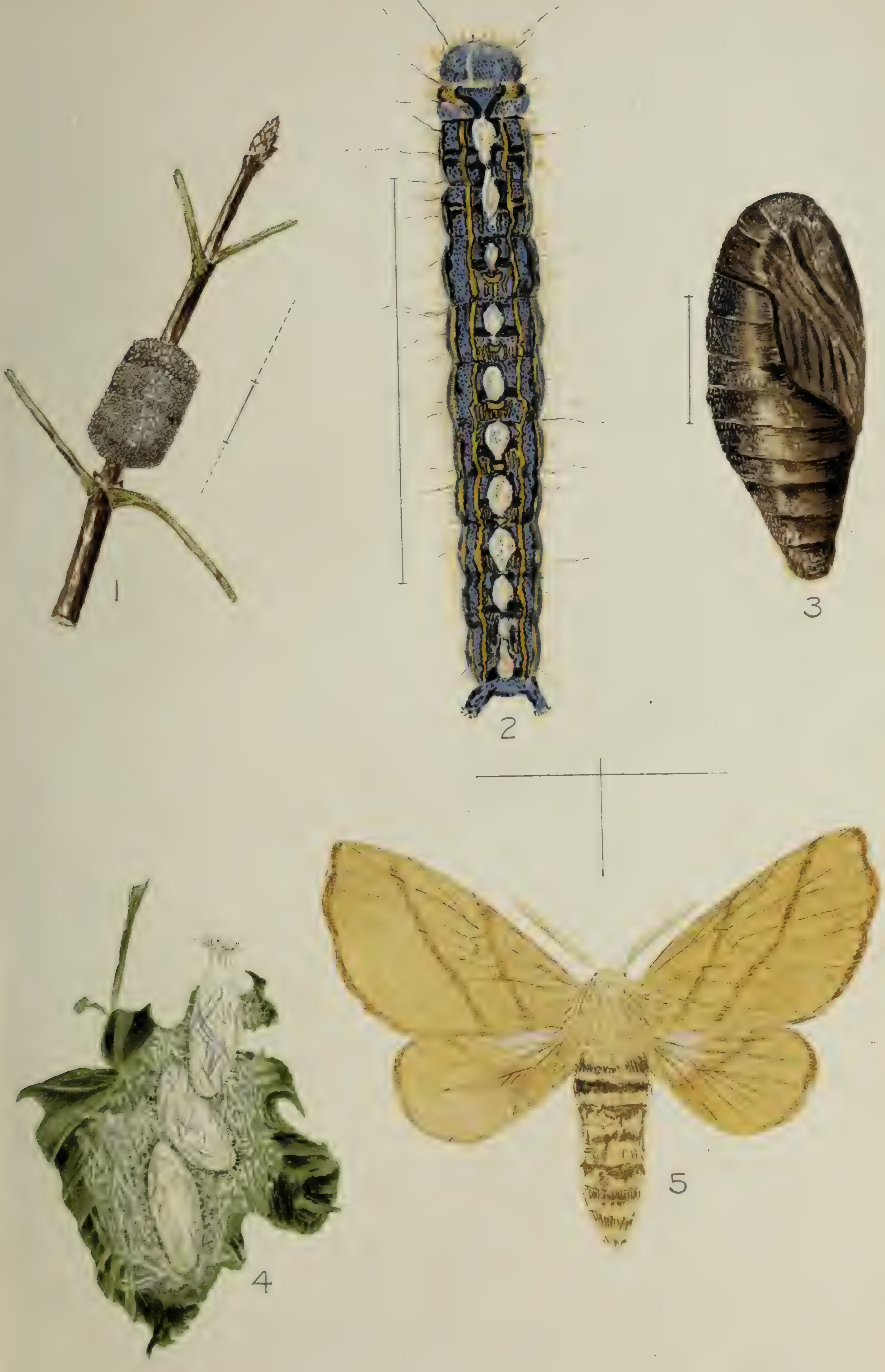
Insect changes.—The farmer should also have some general knowledge of the transformations of insects in order that he may recognize both friends and foes in their various stages. All insects develop from eggs of one form or another, though in some cases the eggs hatch within the body of the parent. The larva is the active, growing form, and is the stage more frequently destructive. It is variously known as the caterpillar, grub, maggot, "worm," etc. The pupa is the quiescent, resting stage, during which the transformation from the comparatively simple caterpilar to the highly organized butterfly or moth takes place. These changes will be more fully emphasized in the following accounts of certain injurious species:

Apple tree tent caterpillar.—This insect, *Clisiocampa americana*, yearly causes much damage in spite of the fact that its habits are well known and methods of suppressing it are understood. It passes the winter in the egg. The brownish egg mass encircling a twig is represented at figure 1 on plate 1. The young caterpillars may be found well developed within the egg in the fall and emerge therefrom in early spring. They remain in clusters under the familiar tent, feeding on adjacent foliage, and by the time they are half grown, we have the well-known condition represented at figure 3, plate 1. The caterpillars become full grown (plate 1, figure 2) the latter part of May, and at that time may be seen wandering in all directions, seeking a place for spinning their cocoons, several of which are represented at figure 6, plate 1, and one still more enlarged at figure 4. The cocoons are spun in early June and may be found in almost any convenient crevice, affording some shelter from the elements. The pinkish brown moths, plate 1, figure 5, appear from the latter part of June into July, pair and deposit the eggs which produce caterpillars another season.

It is comparatively easy to collect and destroy the egg clusters, as most of them are on the lower limbs. If the orchard is systematically sprayed, even this is unnecessary. The creatures can also be destroyed when collected in their nests, either by tearing the nests out and crushing, or by burning. The latter is hardly advisable on account of injury to the tree.

Forest tent caterpillar.—A closely related insect and one which attracted far more attention last summer is shown on the next plate. It is variously known as the forest tent caterpillar or maple worm, scientifically as *Clisiocampa disstria*, and is a close relative of the preceding form. Like it, the winter is passed by the well-developed caterpillar within the egg. The smaller, shorter, lighter colored egg belt is represented at figure 1, plate 2. The eggs are frequently found in large numbers on small sugar maples, if there be any in the vicinity. On moderate-sized trees, a large proportion are found on twigs within twenty or thirty feet of the ground, while on large trees it is not unusual to find them in considerable numbers at a greater height. The caterpillars begin to emerge from the eggs with the advent of warm weather in the spring and continue to appear for about a month. The first evidence of infestation, if the eggs have not been previously noticed, is a thinning of the upper leaves. The young caterpillars may be found in clusters on the branches, and as they increase in size the clusters are found lower and lower, till, when nearly full grown, large patches may be found on the trunks of the infested trees. It will be seen by comparing figures 2 on plates 1 and 2, that the forest tent caterpillar is characterized by the possession of a row of somewhat diamond-shaped silvery spots down the middle of the back, while the apple tree tent caterpillar has a narrow dorsal line of the same color. The forest insect does not form a tent in the crotches of the limbs, a habit so characteristic of the species usually found

PLATE 2



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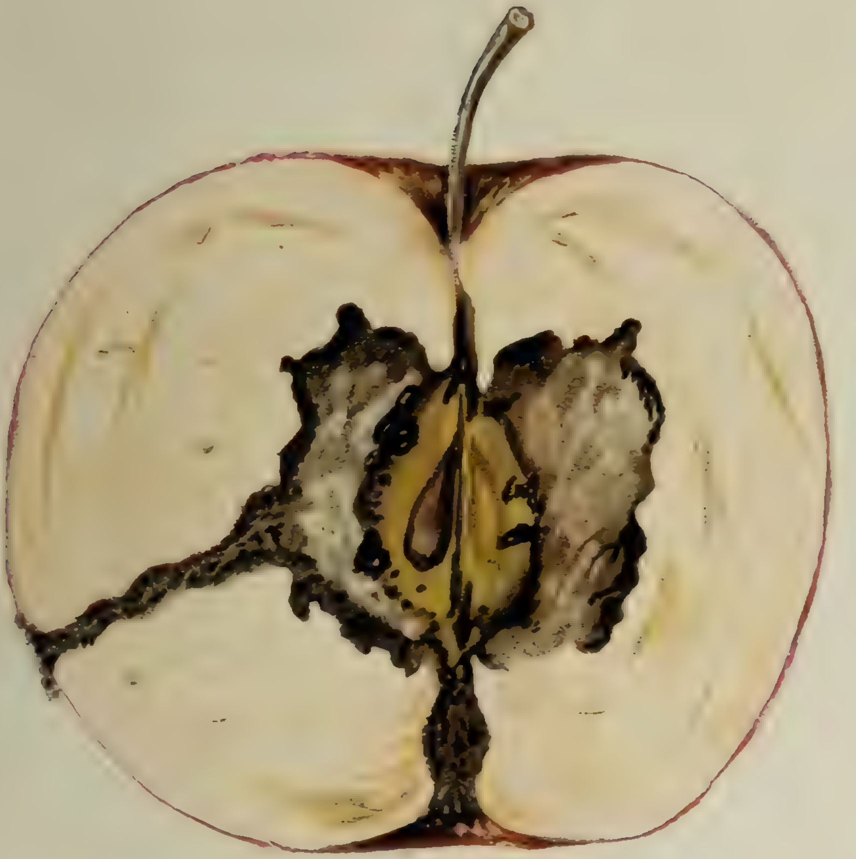
Forest Tent Caterpillar

on apple trees. The full-grown caterpillars wander in search of a place to spin cocoons about the first of June, spinning up about the middle of that month, but some may be found the latter part of June and even in early July, so irregular is their development. The cocoons, as frequently spun in a leaf, are represented at figure 4, plate 2. They may also be found under ledges of houses, in fence corners and almost any convenient shelter. The moths may be taken from the latter part of June into August, being most abundant in early July. Pairing takes place at this time, and the eggs are deposited for the next year's generation. As is well known, this species has a special fondness for sugar maples, and has caused much injury to the sugar bush of this and the adjoining State of Vermont. The effect attacks by this insect have is shown by the following: Mr. Tremain Bloodgood, of Hensonville, Greene county, found that maples defoliated in 1897 and '98 yielded in 1898 and '99 one-half the usual amount of sap, and that more of it was required to make one pound of sugar, though the quality of the latter was not affected. Mr. Jared Tiffany, of East Jewett, found that the largest and best maples suffered most, and that two or three defoliations kill a tree or render it practically worthless, as the flow of sap is very small and the little secured is almost unfit for use. Professor Perkins, entomologist of the Agricultural Experiment Station of Vermont, reports that the crop was not one-half or two-thirds the usual amount in his State, and that the yield was light even in localities where the tent caterpillar was not abundant. In most places it is hardly probable that the pest will be abundant for more than three or four years in succession.

Value of native birds.—The cause leading to the outbreak of this native species is interesting and worthy of some attention. The pest is undoubtedly controlled to some extent by climatic conditions, and insect parasites are also valuable aids in keeping it in subjection. Unfortunately, we can not control climate, and there is not much that is practicable in the way of encouraging or protecting parasites. It is believed that the native birds are important aids in keeping this insect in control. Mr. E. H. Forbush, ornithologist to the Massachusetts State Board of Agriculture, has kindly supplied me with the following list of native birds observed feeding on forest tent caterpillars: Oriole, black-billed cuckoo, yellow-billed cuckoo, crow, blue jay, redstart, nuthatch, wood thrush, chewink, black and white creeper, red-eyed vireo, flicker and scarlet tanager. Mr. V. H. Lowe has observed the black-capped chickadee feeding on the eggs and the robin on the caterpillars, beside others mentioned. Professor C. M. Weed states that the robin, chipping sparrow, yellow bird and English sparrow feed on the moths. In view of the fact that our best authorities have estimated that bird life in New York State has decreased 48 per cent. in the past fifteen years, it seems reasonable to attribute this outbreak by forest tent caterpillars in part to the decline in the number of birds. The following accounts illustrate the value of our feathered friends: In a typical orchard at Medford, Mass., Mr. Forbush took a little trouble to attract the native birds, the nests of the English or house sparrow being destroyed. The results were greatly in favor of protecting our indigenous forms. In the neighboring orchards it was evident that canker worms and tent caterpillars were abundant, but in the orchard in question the trees were seriously injured in only one or two instances, though no attempt was made to control the insects by spraying or other artificial means. The following note relating to forest tent caterpillars is by Miss Caroline G. Soule: "The nuthatches would stand by a patch of larvæ lying close together below a tar band on a tree and eat so voraciously and with such an entire abandonment of self-consciousness that I could go close and put my hand on them before they would fly. This experience was repeated several times."

Our native birds are undoubtedly of great value and will richly repay any slight effort that may be made for the purpose of attracting them to a neighborhood. Winter birds may be induced to remain in a locality by hanging in the trees pieces of meat or partially picked bones, and will spend much time in searching

PLATE 3



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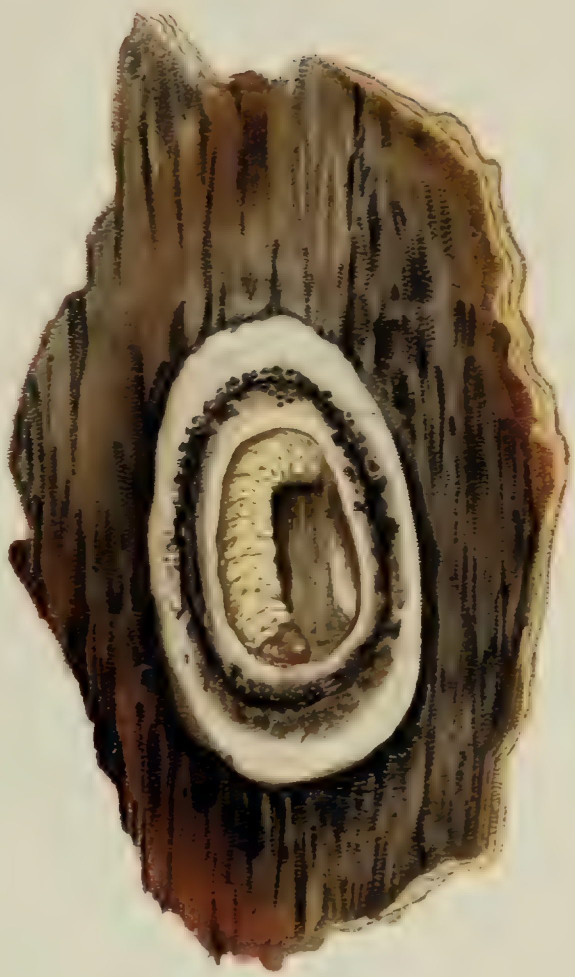

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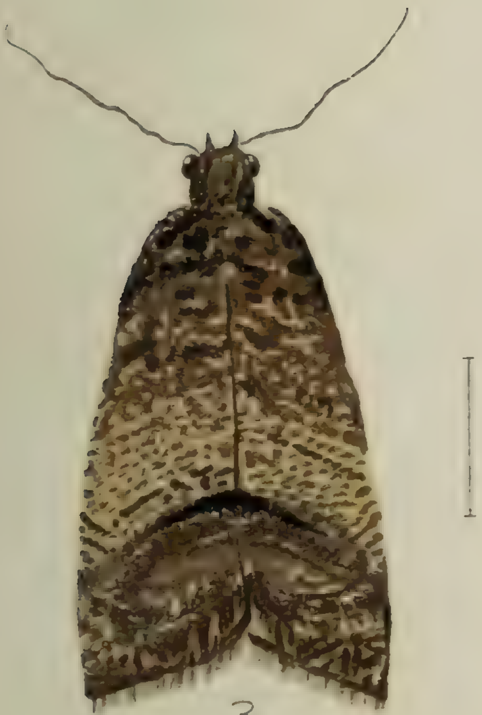

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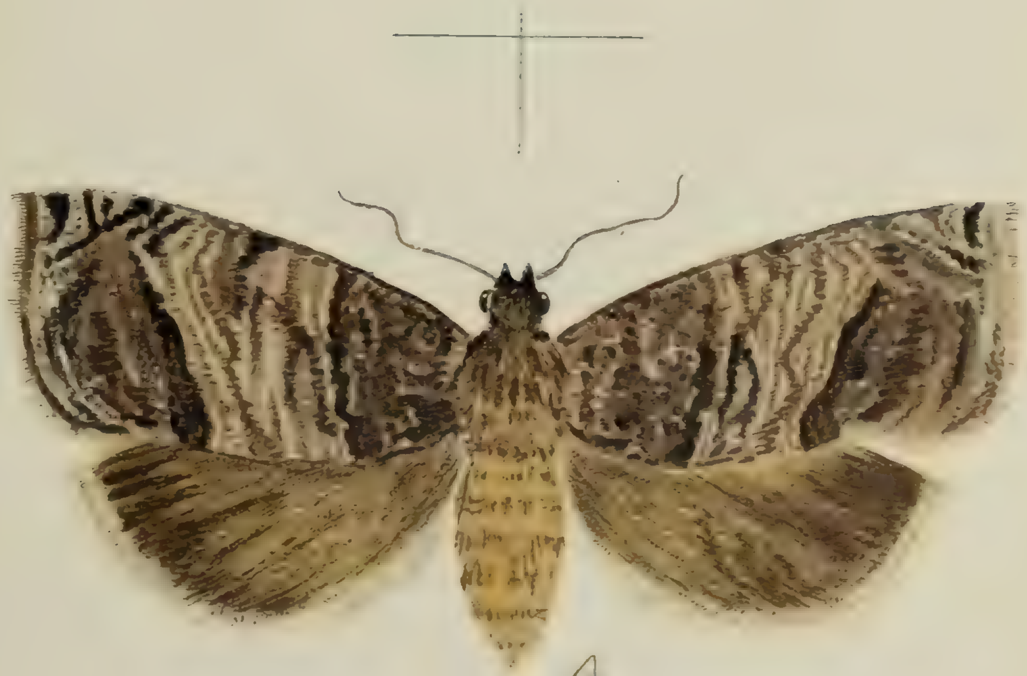

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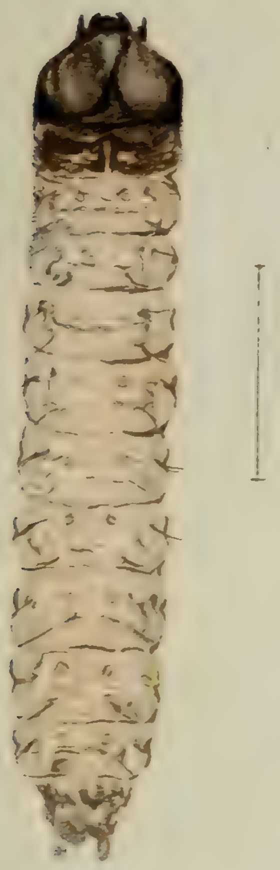
Codling Moth.

out and devouring numerous insects and their eggs, relying on the meat only when conditions are unfavorable for obtaining insect food. Migratory birds may be induced to remain in larger numbers in a locality by providing them with suitable nesting places and materials, and by affording them protection from cats and other enemies, not excepting man. Thickets in the vicinity will afford shelter for certain species, and if a few mulberry trees are set out their fruit will serve to protect the cherries, as the birds are said to eat mulberries by preference. Most of these suggestions are taken from a very practical paper by Mr. Forbush.

Remedies for forest tent caterpillar.—There is little that can be done to prevent the ravages of this insect in forests and large sugar bushes, aside from protecting birds, but in orchards, on shade and other of the more valuable trees it is practicable to fight this insect in the egg, caterpillar and cocoon stages. During the winter and early spring the lower twigs bearing egg clusters should be cut off and burned. Every egg mass thus destroyed means approximately 200 less caterpillars to fight the coming spring. As soon as the pests cluster in the trees, they should be brushed down or dislodged with a torch. The latter method is hardly advisable on account of the danger of injuring the tree. Many caterpillars can be jarred from the limbs. In whatever way they are gotten out of the tree, bands should be employed to prevent the caterpillars from ascending. A strip of cotton batting tied tightly around its middle to the trunk and the upper portion turned back over the string makes a very effective barrier so long as it remains dry. Bands of tar, grease, equal parts of lard and sulphur, etc., are very effective in preventing the creatures from climbing the trees, once they have been gotten out. If these latter substances are used, it will be safer to first put on a band of thick paper and apply the grease or tar to it, thus avoiding danger of ultimate injury to the bark. Wherever the caterpillars are at all abundant, it will probably be necessary to kill those collecting below the bands with hot water, kerosene emulsion or by crushing. These insects yield readily to arsenical poisons, particularly if the application is timely, but conditions are not always such that spraying is practicable. Sometimes when the caterpillars are present in very large numbers and the poison has not been applied till late, the trees may be stripped in spite of the insecticide, but under ordinary conditions there need be little fear of the poison proving ineffective. Where spraying is not done, it will probably be wise to supplement the destruction of eggs and caterpillars by collecting and burning the cocoons. The village of Glens Falls, and several others, paid school children 10 cents per quart for collecting the cocoons in 1899, and excellent results were obtained. At Glens Falls 1350 quarts of cocoons were destroyed. Whenever this is done to any great extent, it would be well to put the cocoons in boxes covered with a wire netting, about 3-16 inch mesh, so as to allow the smaller parasites to escape and yet to confine the moths. When the caterpillars are present in large numbers nothing but the most vigorous measures will prevent severe injuries to the infested trees.

Codling moth.—One of the most important orchard insects today is the common codling moth or apple worm, *Carpocapsa pomonella.* The wormy apple, well represented at figure 1, on plate 3, is familiar to most of us. Were we to go into the orchard in winter and look under partly loosened bark scales, we would find a condition very much as represented at figure 2, on plate 3. Under the loose bark there is a silken cocoon and within it a partly curled, whitish worm or caterpillar, which is represented much larger at figure 1, plate 4. The winter is passed in this condition. In the spring the transformation to the pupa occurs and about the time the apple trees blossom, the moths (plate 3, figures 3, 4) come forth. About a week later the eggs are laid on the leaves or sides of the young fruit and in about two weeks from blossoming the young caterpillar or apple worm emerges from the egg and usually enters the fruit at the blossom end. This habit renders the control of the pest by spraying comparatively easy, provided it is done thoroughly and at the right time. Any time after the white petals have fallen and before the green calyx lobes have closed is the proper time to spray for this pest. Figure 3 on

PLATE 4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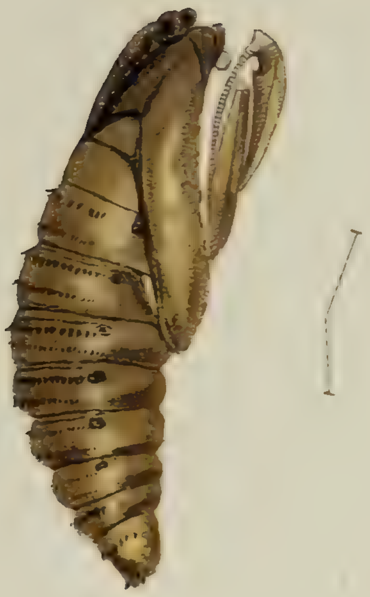
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Codling Moth.

plate 4 shows the calyx lobes open and in the right condition for spraying and figure 4 the condition when the calyx lobes have closed and the impossibility of throwing the poison where it will be most effective. It may be well to delay spraying a few days after the blossoms have fallen so as to reduce to a minimum the danger of having the poison washed out of the blossom cup by rains, but delay beyond a certain period is dangerous because the calyx lobes in most varieties of apples close in about two weeks after the petals fall and then it is too late to do effective work against this insect. Ample time allowance should be made, as the spraying may be hindered by bad weather. The spray should be rather coarse because then it fills the calyx cup more readily. There is practically no danger in spraying young apples with arsenical poisons.

Those who do not or can not resort to spraying must depend on the destruction of the infested fruit shortly after it falls. One correspondent found comparative immunity from this pest by allowing hogs to run under his apple trees. Sheep or other domestic animals could be utilized in the same manner to good advantage in certain cases. As the apple worms leave the fruit when full grown and spin cocoons under shelters on the trunks, banding the trees and destroying the cocoons found underneath aids materially in reducing the numbers of this pest. Scrape the trunk smooth and apply a band of cheap paper, burlap or similar material in June. These bands should be examined every ten days till August and then once in the fall, destroying all found under the shelter. As many of the pests are liable to be carried into the fruit cellar, it is always wise to prevent the escape of the moths in the spring by covering all openings with fine wire netting.

Sugar maple borer.—The sugar maples in many villages show most serious injury by the sugar maple borer, *Plagionotus speciosus.* This insect is specially dangerous because the large, white, fleshy grubs thrive in healthy trees and have the pernicious habit of running their large burrows through the inner bark and sap wood. As many of these burrows have a transverse, oblique direction for a part of their course, it is by no means uncommon to see trees partly girdled through the activity of this borer. I have seen maples fifteen and eighteen inches in diameter half girdled by a single burrow. It is apparent to all that only a few such borers are necessary to cause considerable injury. The beautiful parent beetle, represented at figure 1, is rarely seen, but evidences of the insect's work are very apparent. The large, white, fleshy grub or borer is not often observed. It is a most insidious worker and probably the best method of controlling it on shade trees is to search each fall for the discolored, wounded areas, showing the place where the young larvæ have entered the bark, and then to destroy the pests. There is little danger of harming the tree more by digging the borer out than the creature would if left to itself. The young borers frequently enter the tree at favorable points on the trunk and branches just as the larger limbs spring out from the main stem. Applications of the soap carbolic acid wash about the middle of May, and renewal of the same in June, would probably aid somewhat in preventing the deposition of eggs, though at present it is impossible to state the true value of this preventive.

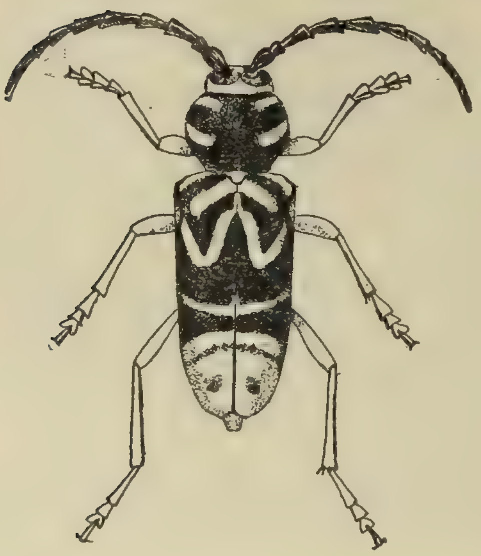

FIG. 1 Sugar maple borer, parent beetle (original).

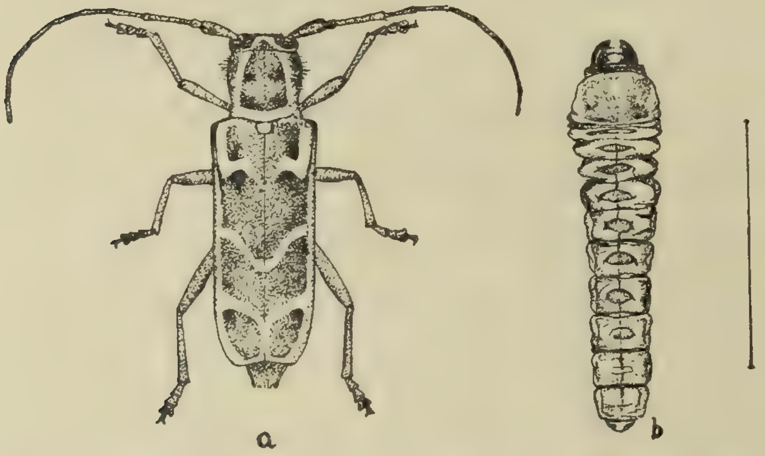

FIG. 2 Elm borer: *a* adult; *b* half grown larva—hair line represents natural size of latter (original).

Elm borer.—American elms are frequently attacked by a borer working beneath the bark. There is no practical method of fighting it. About the best that can be done is to keep the elms in a vigorous condition and cut and burn all affected limbs.

Elm leaf beetle.—In the Hudson river valley there is another elm pest of considerable importance, and as it will soon make its way to other sections of the State, it is worthy of a brief notice in this connection. I refer to the elm leaf beetle, *Galerucella luteola*, an insect which has killed thousands of elms in the state and one that in all probability will cause much greater loss in the next decade. It has already been reported as present at Oswego and Rochester, and may occur at many other places in western New York. The yellowish, black striped beetles about one-fourth of an inch long pass the winter in houses, sheds, crevices in trunks and similar shelters. In the early spring they come forth, fly to the trees and begin feeding on the unfolding leaves. Clusters of three to over 20 yellowish eggs are deposited on the under surface of the leaves throughout May, the young hatching about the first of June, and completing their growth in 15 or 20 days. There are two broods annually in Albany and vicinity. The beetles eat irregular holes in the foliage and the grubs feed exclusively on the under surface; hence in order to poison both forms, it is imperative that the leaves be sprayed from the under side. Where spraying with poison is not done, some relief may be obtained by killing the golden yellow pupæ with hot water, kerosene emulsion, etc., after they have collected in large numbers about the base of the tree. This latter means can be made more effective by scraping the rough bark from the tree and then constructing an inclosure a few inches high around the base of the tree. Killing the insects once in five days will give the best results with the least labor.

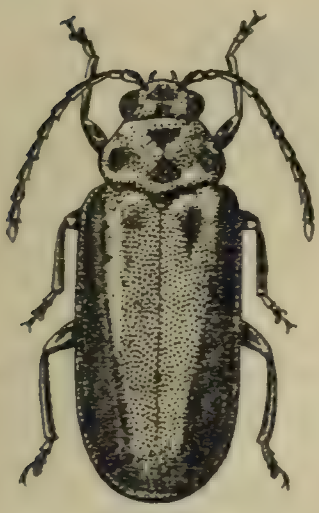

FIG. 3 Elm leaf beetle, adult (reduced from Howard, U. S. dep't agr., Yearbook 1895).

Several very important scale insects are represented at figure 4 and every fruit grower should become familiar with their general appearance.

Old fruit enemies.—Apple tree bark louse, *Mytilaspis pomorum.* The general form of the brown scale of this insect is nicely shown at *a* in figure 4 and were we to examine infested trees in winter we would find under the old scales large numbers of tiny white eggs. The scurfy bark louse, *Chionaspis furfurus,* is represented at *b* in figure 4. The common name is descriptive of the white, scurfy condition of badly-infested trees. On breaking away the protecting scale in winter numbers of purplish eggs may be found occupying the scale cavity. The winter is passed by both species in the egg stage. About June 1st the young appear and may be seen crawling in large numbers over the trunk and limbs of the infested trees. Either of these scale insects can be kept under control by spraying the young with a contact insecticide like whale oil soap solution, kerosene emulsion, the formulas for which are given at the close of this article.

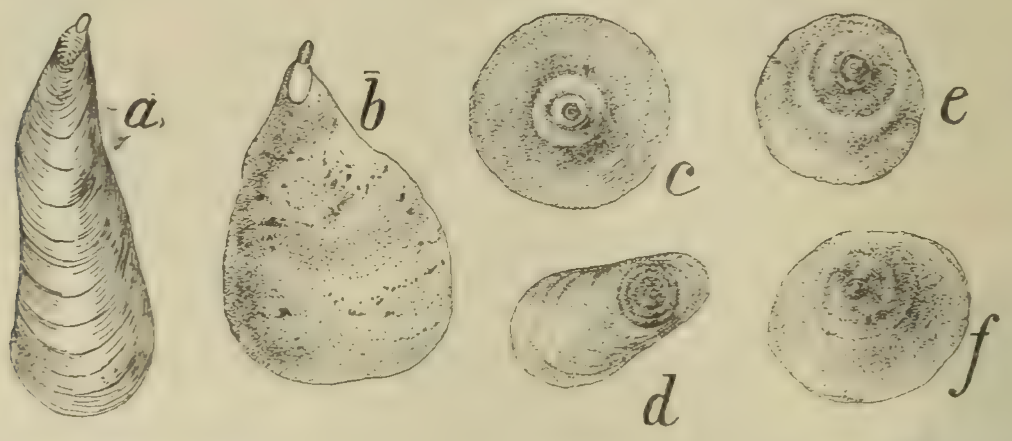

FIG. 4 Scale insects: *a* apple tree bark louse; *b* scurfy bark louse; *c* San José scale *d* male of same; *e* English oyster scale; *f* Putnam's scale (original).

San José scale.—The most important pest represented in figure 4 is this species, *Aspidiotus perniciosus.* Figure 4*c* represents the female scale and at *d* the male scale is shown. Observe the roundness of the ash-gray scale, the central nipple and the lighter ring surrounding it. The adult female scales are frequently considerably larger and of a yellowish white color. The scale covering these insects is quite variable, and it requires considerable experience to enable one to distinguish with surety between this species and certain closely related forms and even then the entomologist frequently prefers to take the trouble to make a mount for the microscope and study the insect itself before passing on the identity of the species. A closely related form is *Aspidiotus ancylus* or Putnam's scale. It is represented at figure 4*f*. It can be separated at once from the San José scale by the eccentricity and the yellow or reddish color of the nipple. There is another species, *Aspidiotus ostreæformis* (figure 4*e*), which resembles the San José scale very closely indeed. If trees are infested by scale insects or even present a suspicious appearance, it is by all means advisable to cut off a small twig and submit the same to some entomologist for examination. The San José scale is dangerous on account of its inconspicuousness and also because of its great prolificacy. A tree may be nearly covered by this scale and nothing be suspected. I have known such to be the case, even when a bright and intelligent man and his two boys had endeavored to keep posted and had been looking for the creature. Careful studies have shown that in the latitude of Washington, D. C., four and even five generations could be produced in a year and that the descendants from one female might in one season reach the enormous estimate of 3,216,080,400 individuals. In New York state not over three generations annually would probably be the rule, but even with our climatic conditions the insect is able to keep up with a rapidly growing apple tree, as is shown by a twig fifteen inches long of 1898 growth being nearly covered with the scale at the end of that season.

Very diverse opinions are held regarding this insect and its destructiveness. It is at least a pest no man cares for and it is much easier to exclude it from the farm than to maintain a perpetual warfare to keep it in subjection. There are many sections in the state where this pest has not become established and thousands of farmers and horticulturists are in a position to prevent the San José scale from gaining a foothold in their orchards. To every such person I would say, buy only trees that have been fumigated with hydrocyanic acid gas or else fumigate every tree and shrub before it is set out. This measure is not only our most practical method of safeguarding against the introduction of the San José scale but is equally valuable against many other imported insects. The importance of this latter has already been emphasized. Nothing but the most heroic measures will stamp out the pest after it has become established and these will be successful only in places where the infestation is very limited. If but few trees are infested and there is no danger of its being in nearby localities, it would be far wiser promptly to destroy everything bearing the scale and start anew, rather than attempt to save the trees. An infestation of considerable extent can hardly be fought otherwise than by repeated treatments with contact insecticides. Whale oil soap has proved about as effectual as any, though the mechanical kerosene emulsion has been strongly endorsed by some. Perhaps the most promising treatment is found in the use of a 20-per-cent. mechanical emulsion of crude petroleum applied in early spring before the buds start. There is no doubt of its killing a large proportion of the scales. There is less danger to the fruit buds if winter treatment be delayed till early spring and if crude petroleum emulsion be used, the viscid residue remains sometimes on the limbs and trunk and is very unfavorable to the establishment of young scales. Crude petroleum cannot be applied to leaves but it is said to injure only growing wood, even in summer. Its use undiluted cannot be recommended at present. The summer treatment with other contact insecticides consists of several sprayings from when the young begin to appear, sometime in June, till late fall. The frequency of the spraying should depend largely on the abundance of the young. The summer work is usually supplemental to the winter operations. The formulas of contact insecticides for either summer or winter use are given on a subsequent page.

The following catalogue, descriptive of the insects in a small traveling collection of the more important species, was prepared by the State Entomologist and published in a convenient pocket form for distribution at farmers' institutes:

Fruit Tree Insects.

1 **Apple tree tent caterpillar** (*Clisiocampa americana*). Conspicuous web tents in forks of apple and cherry trees contain hairy caterpillars with a white stripe along the back. Cocoons spun the last of May, the light brown moths flying in June. Eggs, in belts encircling the smaller twigs, remain unhatched till spring.

Treatment: remove and destroy eggs or young in nests. Spray foliage of infested trees with poison in early spring.

2 **Codling moth** (*Carpocapsa pomonella*). Familiar as the worm boring in apples near the core. The winter is passed in small cavities under sheltering bark or in crevices.

Treatment: band trees and kill worms collecting under them; destroy wormy apples, spray with poison when calyx lobes are open. Prevent escape of the moths from fruit houses and cellars.

3 **Cigar case bearer** (*Coleophora fletcherella*). Small caterpillars in cigar-shaped cases feeding on buds and foliage of apple.

Treatment: spray infested trees with poison in early spring.

4 **Pistol case bearer** (*Coleophora malivorella*). Small caterpillar in pistol shaped cases feeding on the young leaves and opening flower of the apple.

Treatment: spray infested trees with poison in early spring.

5 **Apple leaf Bucculatrix** (*Bucculatrix pomifoliella*). White ribbed cocoons about ¼ inch long may be seen in clusters on smaller limbs of infested trees. The small larvæ mine the leaves and later feed externally.

Treatment: spray infested foliage with poison in early June.

6 **Rose beetle** (*Macrodactylus subspinosus*). Greenish yellow beetles about ⅜ inch long appear in swarms in May and attack the foliage of various trees and vines.

Treatment: spray beetles with ½ pound whale oil soap to 1 gallon water, dust vines with ashes, etc.; handpicking.

7 **Apple tree borer** (*Saperda candida*). "Sawdust" or diseased bark and beneath the latter, legless, white, round headed borers. The brown beetles, striped with white, about 1 inch long, occur from June to August.

Treatment: protect base of tree with wire netting. Dig out the young borers in the fall. Cut and burn badly infested trees.

8 **Pear midge** (*Diplosis pyrivora*). Dwarfed, deformed, fruit drops early, and within occur thick-bodied, pale yellow maggots.

Treatment: destroy infested fruit.

9 **Peach bark borer** (*Scolytus rugulosus*). Bark of affected trees punctured with many small, circular holes, made by brownish black beetles, less than ⅛ inch long. Inner portions of bark and sap wood filled with burrows.

Treatment: burn badly infested trees. Apply carbolic soap wash to trunks and limbs in early spring.

10 **Pear blight beetle** (*Xyleborus dispar*). Bark of affected trees punctured with many small, circular holes made by dark brown beetles about ⅛ inch long. Inner portions of bark and sap wood filled with burrows.

Treatment: burn badly infested trees.

11 **17-year Cicada** (*Cicada septendecim*). Slit and broken twigs with wilting leaves are characteristic work of this insect, but unless the trees are small not much damage is done.

Treatment: avoid setting out trees in last few years before Cicadas are due.

12 Apple tree bark louse (*Mytilaspis pomorum*). Bark infested with brownish scales shaped like oyster shells. Occurs on many other trees. Winter passed as white eggs under old scales, the young appearing about June 1.

Treatment: spray young with kerosene emulsion or whale oil soap solution.

13 Scurfy bark louse (*Chionaspis furfurus*). The whitish, scurfy scales occur on the bark of fruit trees. The purplish eggs remain under old scales all winter, the young appearing about June 1.

Treatment: spray young with kerosene emulsion or whale oil soap solution.

14 San José scale (*Aspidiotus perniciosus*). A small circular scale not readily seen unless very abundant. Infests many trees and shrubs. The specimens exhibited showed variations in the appearance of the scales and how it may be disseminated by budding. Young appear from early June till cold weather.

Treatment: destroy badly infested trees, specially if young, and spray others thoroughly in early spring with 20 per cent mechanical emulsion of crude petroleum, kerosene emulsion or whale oil soap solution. Fumigate with gas.

15 English oyster scale (*Aspidiotus ostreæformis*). Resembles San José scale in appearance and like it infests fruit trees. Occurs in several localities in this State and should be guarded against.

Treatment: spray infested trees with kerosene petroleum or emulsion, or whale oil soap solution. Fumigate with gas.

16 Putnam's scale (*Aspidiotus ancylus*). Resembles the two preceding species, but is less injurious. Attacks various trees.

Treatment: same as preceding.

Small Fruit and Vine Insects.

17 Currant worm (*Pteronus ribesii*). Greenish, black dotted saw fly larvæ feeding on currant leaves in May, the common currant worm.

Treatment: spray with hellebore.

18 Currant span worm (*Diastictis ribearia*). Yellowish, black dotted span worms feeding on leaves in May and June.

Treatment: spray with poison or handpicking.

19 Currant stem borers (*Sesia tipuliformis, Janus integer, Tenthredo rufopectus*). The caterpillars boring in the woody stems are sesians. The maggots working in the tender tips may be either those of *Janus* or *Tenthredo.*

Treatment: burn stems infested with sesians and the wilting tips infested by the others.

20 Raspberry gouty gall beetle (*Agrilus ruficollis*). Irregular swellings on canes are produced by larvæ of this pest.

Treatment: cut and burn infested canes during winter or early spring.

21 Light loving grapevine beetle (*Anomala lucicola*). Brownish or black beetles about ⅜ inch long resembling a small June beetle.

Treatment: dust vines with lime. Collect and destroy beetles.

22 Spotted grapevine beetle (*Pelidnota punctata*). Brown, black spotted beetles about 1 inch long resembling a June beetle.

Treatment: handpicking.

23 Grapevine flea beetle (*Haltica chalybea*). Greenish or blue beetles about ⅛ inch long feeding on buds, or brownish, black dotted larvæ about ½ inch long skeletonizing leaves.

Treatment: spray with poison, using a large amount on buds, less for young on leaves.

24 Grapevine plume moth (*Oxyptilus periscelidactylus*). Small, greenish, hairy caterpillars webbing together terminal leaves.

Treatment: pick and destroy infested tips.

25 Eight spotted forester (*Alypia octomaculata*). Reddish, black ringed caterpillars about ½ inch long feeding on grapevine and Virginia creeper in spring.

Treatment: handpicking; spray with poison.

26 White flower cricket (*Oecanthus niveus*). Series of punctures in twigs of various kinds are made by this insect for the reception of its eggs. Injury is usually too little to call for remedial measures, specially as the insects are predaceous and therefore beneficial.

Shade Tree Pests.

27 White marked tussock moth (*Notolophus leucostigma*). Beautiful caterpillars having three black plumes, four yellow or white tufts, a coral red head, and body marked with black and yellow; defoliate horse chestnut, elm and other shade trees. Winter passed in white, frothy egg masses, the caterpillars hatching the latter part of May and spinning up about a month later, the moths appearing in July. Two broods about New York city, but one farther north.

Treatment: destroy eggs or spray foliage of infested trees with poison.

28 Forest tent caterpillar; maple worm (*Clisiocampa disstria*). Foliage of maple and fruit trees eaten in May and June by hairy blue headed caterpillars with silvery spots along the back. Cocoons spun in June, the brown moths flying in July. Eggs, in belts encircling smaller twigs, remain unhatched till spring.

Treatment: destroy eggs; kill the caterpillars when massed on trunk and limbs; spray foliage of infested trees with poison; collect and destroy cocoons.

.29 **Pigeon Tremex** (*Tremex columba*). Adults, frequently known as "horn tails," are usually found in July around diseased and dying tree trunks. The young borers occur near the surface, but full grown ones may make their way to the center of even large trees. Not usually very injurious.

Treatment: cut and burn badly infested trees.

30 **Lunate long sting** (*Thalessa lunator*). Brownish, wasp-like insect with yellow markings and a slender ovipositor or "tail" 2 to 4 inches long. Frequents elms and maples infested by the pigeon Tremex and is occasionally found with the ovipositor stuck in the wood. The white, legless grubs attach themselves to the borers and suck their life out. *This insect should* therefore *be protected.*

31 **Cottony maple tree scale insect** (*Pulvinaria innumerabilis*). Under side of smaller limbs sometimes festooned with this cottony insect, though more frequently it occurs in small masses. Young appear in July.

Treatment: spray with kerosene emulsion or whale oil soap solution. Brush or scrape off and destroy the old scales.

32 **Sugar maple borer** (*Plagionotus speciosus*). Diseased or loose bark and exposed dead wood indicate the work of this pest. The grubs frequently cause serious injury by running transverse burrows just beneath the bark. The stout, black beetles about 1 inch long with bright yellow markings, occur from June to August.

Treatment: burn badly infested trees. Dig out the young borers in the fall. Protect trees with carbolic soap wash from June to August.

33 **Maple tree pruner** (*Elaphidion villosum*). Small limbs of maple, oak and other trees nearly eaten off by an insect and dropping in September, usually contain the pupæ of this species.

Treatment: collect infested limbs on the ground and burn before spring.

34 **Elm leaf beetle** (*Galerucella luteola*). Irregular round holes eaten in young foliage followed by the grubs gnawing the under portions of the leaves, which then dry and turn brown. The yellowish, black striped beetles, about ¼ inch long, appear in early spring and lay eggs in May. The grubs feed in June, changing to yellow pupæ the latter part of the month. A second brood occurs in July and extends into September. Known in this State only on Long Island, in the Hudson River valley and in scattered localities in central New York.

Treatment: spray foliage of infested trees with poison, which *must be applied to under surface* of the leaf in order to kill the grubs. Kill larvæ and pupæ on and near trunks of the trees.

35 **Elm bark louse** (*Gossyparia ulmi*). Adult females in June appear like clusters of small lichens on the under side of the smaller limbs of European elms. Young emerge in July.

Treatment: spray with kerosene emulsion or whale oil soap solution.

36 **Elm borer** (*Saperda tridentata*). Diseased or dead bark and in inner portions white, flattened legless grubs, which frequently cause considerable injury. Beetles appear from early May till latter part of June.

Treatment: cut and burn badly infested trees. Protect valuable trees with carbolic soap wash during May and June.

37 **Elm snout beetle** (*Magdalis barbita*). Thick, fleshy, legless grubs working in inner bark of elm. Follows attack by the elm borer and occasionally is very abundant.

Treatment: burn badly infested trees and keep others vigorous.

38 **Fall web worm** (*Hyphantria cunea*). Web tents in July and August inclosing leaves on the tips of branches, the eaten foliage turning brown. Attacks many trees.

Treatment: destroy webs and their inhabitants or spray foliage of affected limbs with poison.

39 **Bag worm** (*Thyridopteryx ephemeræformis*). Defoliated evergreens and other trees are found infested with curious cocoons or bags containing caterpillars in late summer and fall. Occurs in vicinity of New York city.

Treatment: collect and destroy bag worms or spray with poison.

40 **Leopard moth** (*Zeuzera pyrina*). Whitish, black spotted caterpillars making large burrows in various trees. A bad pest about New York city.

Treatment: dig out young borers. Kill others with carbon bisulfid. Destroy badly infested trees.

41 **Bronze birch borer** (*Agrilus anxius*). If injured bark is examined, a slender flat headed grub will be found running burrows in all directions in the inner portions. White and other birches are attacked. Very injurious at present in Buffalo. Beetles appear in June.

Treatment: cut and burn badly infested trees.

Garden Insects.

42 **Colorado potato beetle** (*Doryphora 10-lineata*). Stout yellowish beetles with black striped wing covers appear in early spring, feed and deposit yellowish eggs in clusters on under surface of leaves. The reddish, black marked grubs also devour the foliage.

Treatment: handpicking; spray vines with poison.

43 **Squash vine borer** (*Melittia satyriniformis*). Wilting of one or more runners is caused by a whitish caterpillar boring in the stem near the root.

Treatment: slit the softer, infested portion of the vines, remove the borers and cover the wounded part with earth. Protect young plants with netting.

44 **Striped cucumber beetle** (*Diabrotica vittata*). Yellow beetles about ¼ inch long, striped with black, occur in numbers on cucumber and squash vines.

Treatment: protect young vines with netting. Dust vines with ashes, plaster of paris, etc. Poison trap crop of squash.

45 **Cucumber flea beetle** (*Epitrix cucumeris*). Brownish, gnawed spots on leaves made by numerous black jumping beetles about 1-16 inch long.

Treatment: Spray vines with Bordeaux mixture.

46 **Squash bug** (*Anasa tristis*). Wilting leaves with their under surface infested by greenish young or the large grayish brown stink bugs about ¾ inch long.

Treatment: place chips and similar shelters near the vines and kill daily the bugs collected underneath. Crush the brownish eggs on under surface of the leaves.

47 **Common asparagus beetle** (*Crioceris asparagi*). Slate colored grubs about ⅓ inch long or yellowish and bluish green beetles about ¼ inch long eating the more tender portions of the plants. Occurs on Long Island, in Hudson River valley and in the lake regions of the western part of the State.

Treatment: dust young plants when wet with dew with plaster of paris and poison.

48 **12-spotted asparagus beetle** (*Crioceris 12-punctata*). Slate colored grubs about ⅓ inch long or stout, nearly cylindric red beetles with 12 black spots, eating the more tender portions of the plant. Known to occur in the State in a number of widely separated localities.

Treatment: same as above.

49 **Flea beetle on sugar beets** (*Systena frontalis*). Ragged holes and brown spots made by small, jumping, black, red-headed beetles about 3-16 inch long.

Treatment: spray affected plants with poison or bordeaux mixture.

50 **Blister beetles** (*Epicauta cinerea E. vittata*). Feeding in July and August on the foliage of potato and other plants, cylindric, soft beetles about ⅝ inch long and black and gray, or black striped with yellow.

Treatment: as the grubs of these beetles are known to feed on the eggs of grasshoppers and are therefore beneficial, the adults should be destroyed, by spraying affected plants with poison or by beating the insects into pans containing water and kerosene, only when necessary.

51 **Bumble flower beetle** (*Euphoria inda*). Brownish, mottled beetles about ⅝ inch long, feeding in ears of green corn, attacking peaches.

Treatment: handpicking.

52 **Wireworms** (*Elateridæ*). Cylindric, hard, yellowish brown creatures attacking various plants, frequently injuring planted seeds.

Treatment: fall plowing. Trapping beetles with poisoned baits.

53 **Stalk borer** (*Hydrœcia nitela*). Wilting potato vines and within a brown, white striped, active caterpillar about 1 inch long. Attacks many thick-stalked, herbaceous plants.

Treatment: burn infested stalks before September.

54 **Variegated cut worm** (*Peridroma saucia*). Stout, brownish cut worms with obscure markings and about 1½ inches long. Injurious to various garden plants.

Treatment: place poisoned baits near plants to be protected.

55 **Zebra caterpillar** (*Mamestra picta*). Brilliantly marked black and yellow, red-headed caterpillar about 2 inches long frequently found on cabbage, beets and other garden crops.

Treatment: spray affected plants with poison, hellebore or pyrethrum water.

56 **Cabbage butterfly** (*Pieris rapæ*). Large irregular holes eaten in cabbage by a greenish caterpillar. White butterflies abundant in the field.

Treatment: capture the butterflies with nets. Spray young cabbage with poison, older ones with hellebore or pyrethrum water. Dust with lime.

57 **Cabbage thrips** (*Thrips tabaci*). Cabbage and lettuce show white spots as though blasted, caused by minute yellowish or brown insects.

Treatment: spray affected plants with kerosene emulsion or a soap solution.

58 **Tarnished plant bug** (*Lygus pratensis*). Small yellowish and black bugs about ¼ inch long frequenting many plants and injuring most garden crops and some trees.

Treatment: handpicking or dusting with ashes. Burn all rubbish in the fall.

59 **Four lined leaf bug** (*Pœcilocapsus lineatus*). Yellowish bugs with four black stripes, about 5-16 inch long, frequenting various plants and injuring some considerably.

Treatment: dust affected plants with ashes. Spray young with kerosene emulsion. Cut and burn tips of bushes containing eggs.

Grass Insects.

60 **Army worm** (*Leucania unipuncta*). Brownish, white striped caterpillars about 2 inches long devouring grasses and allied plants.

Treatment: confine by ditching, kill with poisoned baits. Prevent their occurrence by clean culture.

61 **White grubs** (*Lachnosterna fusca, Allorhina nitida*). Fleshy, white, brown-headed grubs severing grass roots and those of other plants. Allorhina occurs in vicinity of New York city.

Treatment: spray badly infested areas liberally with kerosene emulsion just before a rain. Dig and destroy the grubs.

62 **Grasshoppers.** A number of species attack various crops.

Treatment: place poisoned baits near crops to be protected.

Household Insects.

63 **House fly** (*Musca domestica*). Easily recognized as the common fly around houses.

Treatment: exclude with screens. As it breeds in manure and garbage, keeping this material cleaned up or inaccessible to flies will reduce their numbers.

64 **Bed bug** (*Acanthia lectularia*). A flattened, reddish insect about ¼ inch long frequenting houses, specially those affording numerous cracks where it can find shelter and where uncleanliness prevails.

Treatment: apply benzine, kerosene or other petroleum oil to crevices in infested beds. Corrosive sublimate may be used in same manner. Fumigation with sulphur is valuable wherever possible.

65 **Kissing bug: masked bed bug hunter** (*Opsicœtus personatus*). A brownish or black insect about ¾ inch long. It is attracted by lights, and its young, which conceals itself by a covering of lint, etc., is said to have a partiality for bed bugs. Not usually harmful, though it can inflict a severe bite or "sting."

Treatment: screens should exclude it most effectually.

66 **Buffalo carpet beetle** (*Anthrenus scrophulariæ*). Larvæ easily recognized by their shaggy appearance, being provided with coarse bristles along the sides and at the posterior extremity of the body. The beetles are about ⅛ inch long, black, marked with white and a red line widening into three projections, down the middle of the back.

Treatment: use rugs or matting in place of carpets whenever possible. Infested carpets should be taken up and sprayed with benzine and the cracks in floors should be filled with plaster of paris before relaying the carpet.

67 **Black carpet beetle** (*Attagenus piceus*). Light brown, cylindric larva with a long "tail" of slender hairs. The adult is a small, oval, black beetle about ⅛ inch long. This species has a decided taste for feathers.

Treatment: Same as for the preceding.

68 **Little red ant** (*Monomorium pharaonis*). The common yellowish red ant about 3-16 inch long that frequents houses in such numbers at times.

Treatment: destroy colony with carbon bisulfid when possible. Attract to sponge filled with sweetened water and kill the collected ants by dropping them in hot water.

69 **Bacon beetle** (*Dermestes lardarius*). Dark brownish beetle about 5-16 inch long with yellowish band on wing covers. Larva brown, hairy, about ⅝ inch long. Both adult and larva attack bacon, meat, etc.

Treatment: cleanliness and excluding insects from the food.

70 **Croton bug** (*Phyllodromia germanica*). The smaller, light brown roach about ¾ inch long found in houses.

Treatment: roach poisons, such as Hooper's fatal food. Paris green with sugar has been used successfully, but is a dangerous poison. Fumigate with sulphur where possible. Entice the bugs to enter vessels partly filled with stale beer, from which no escape is provided.

71 **Cockroach** (*Periplaneta orientalis*). The larger, dark brown species, an inch or more long, found in dwellings.

Treatment: same as for the croton bug.

Insects Affecting Stored Grains and Leguminous Seeds.

72 **Grain moth** (*Sitotroga cerealella*). A small caterpillar about 7-16 inch long working in various grains and producing a whitish moth with a wing spread of a little over ½ inch.

Treatment: fumigate infested grain with carbon bisulfid.

73 **Saw toothed grain beetle** (*Silvanus surinamensis*). A small, brown slender, beetle about ⅛ inch long found infesting cereals and dried food products.

Treatment: fumigate infested cereals with carbon bisulfid and allow none of its food to lie long undisturbed.

74 **Indian meal moth** (*Plodia interpunctella*). Whitish caterpillar living in Indian meal and other cereals and fastening the particles of grain together with a web. Moth with the outer two thirds of fore wings reddish brown, the inner portion and hind wings light gray.

Treatment: fumigate infested food with carbon bisulfid.

75 **Confused flour beetle** (*Tribolium confusum*). A rather stout, shining, reddish brown beetle about 3-16 inch long. Very prolific and frequently causes considerable injury.

Treatment: fumigate with carbon bisulfid and clean infested localities.

76 **Bean weevil** (*Bruchus obtectus*). Small, grayish brown beetles about ⅛ inch long breeding in dry beans and eating out numerous holes.

Treatment: fumigate beans in all infested localities with carbon bisulfid as soon as threshed.

77 **Pea weevil** (*Bruchus pisorum*). Brownish or black beetles with indistinct white markings, about 3-16 inch long, infesting peas.

Treatment: same as for bean weevil.

Beneficial Insects.

78 **Silkworm** (*Bombyx mori*). Showing eggs, larva, single and double cocoons, those from which moths have emerged, one from which the silk has been reeled, male and female moths, raw silk; also several other species of silk-producing moths.

79 **Pollen carriers.** A great many insects convey pollen from flower to flower and in certain cases there are some very interesting adaptations. Some of the more common pollen carriers are honey bees, bumble or humble bees, other bees, wasps, flower or Syrphus flies and many others.

80 **Lady bugs.** Certain species are valuable agents in controlling plant lice, which they and their young feed on. Some forms prey on scale insects.

81 **Soldier beetles** (*Chauliognathus* species). The beetles are among the pollen carriers and the grubs prey on the larvæ of the codling moth.

82 **Syrphus flies.** The adults are usually seen among flowers but the work of their frequently brightly colored larvæ in reducing the number of plant lice is not so well known. These beneficial maggots are nearly conical and may be found among colonies of plant life.

83 **Spined soldier bug** (*Podisus spinosus*). Represents a number of species which prey on other insects. This one feeds on various common pests, such as the potato beetle, elm leaf beetle and asparagus beetle grubs.

84 **Red tailed Tachina fly** (*Winthemia 4-pustulata*). Valuable parasite of army worm, tent caterpillar and several other pests.

FORMULAS.

Internal poisons like paris green are used only against insects which devour their food. Place where they must be eaten if the plant is attacked and on nothing soon to be used for food.

Paris green 1 lb., lime 1 lb., water 100-300 gal., or dry 1 lb. to 75 of plaster or flour. *London purple* and *paragrene* may be used in the same manner.

Arsenite of lime. Dissolve 1 lb. white arsenic, 4 lb. sal soda (washing soda, carb. soda) in 1 gallon water by boiling in iron vessel 15 minutes, or till arsenic dissolves, leaving only a little muddy sediment. Add water lost in boiling, use 1 pint of this solution to 40 gallons water, to which have been added 2 lb. freshly slacked lime, or add 1 pint of the solution to 40 gallons bordeaux mixture.

Arsenate of lead. Dissolve 11 oz. acetate of lead (sugar of lead) in 4 quarts of water and 4 oz. arsenate soda (50 per cent. purity) in 2 quarts water, each lot in a wooden pail, then add solutions to 100-150 gallons water. May be used much stronger without injury to plants. Very good paste forms are now on the market.

Poisoned baits. Dip fresh clover or other attractive leaves in strongly poisoned water, placed in infested localities. One lb. paris green, 50 lb. bran, sweetened with molasses or cheap, sugar, mixed to a soft mash with water is good for grasshoppers; 20 lb. dry middlings, 1 lb. paris green, is good for cutworms.

Poison carrier.[1] Heat 1 pint fish oil or cheap animal oil except tallow, 5 lb. pulv. resin in iron kettle with 1 gallon water till resin softens; then add lye solution (1 lb. concentrated lye dissolved as for soap); stir thoroughly; add 4 gallons water and boil two hours, or till mixture will unite with cold water, making a clear, amber colored liquid. Add water to make 5 gallons. Use 1 gallon of the solution to 16 gallons water and add 3 gallons milk of lime and ¼ lb. paris green.

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[1] Recommended by Mr. Sirrine for holding poison on cabbage.

Contact insecticides are effectual only when applied directly to soft bodied insects.

Hellebore (fresh) 1 oz., water 3 gallons. May also be applied dry.

Pyrethrum or *insect powder* (fresh), 1 oz., water 3 gallons.

Kerosene emulsion. Hard soap ½ lb., boiling water 1 gallon, kerosene 2 gallons, dissolve soap in water, add kerosene and emulsify. Or, for limestone regions, 2 gallons kerosene, 1 gallon sour milk, emulsify. Dilute 4-25 times before using.

Crude petroleum. A 20 per cent. mechanical emulsion has proved of great value against San José scale when applied just before the buds opened, and the trees were unharmed.

Whale oil soap. 1½ to 2 lb. to 1 gallon water for winter use; for summer use, 1 lb. to at least 4 gallons water.

Ivory soap. Five-cent cake to 8 gallons water.

Hot water, tobacco in solution or as dust are valuable contact insecticides.

Washes for borers. One pint crude carbolic acid (½ pint refined), 1 gallon soft soap, thin with 1 gallon hot water, stir in acid, let it set over night, then ald 8 gallons soft water. Or to a saturated solution of washing soda add soft soap to make a thick paint; this is improved by 1 pint crude carbolic acid and ½ lb. paris green to 10 gallons of wash. Or in 6 gallons saturated solution of washing soda, dissolve 1 gallon soft soap. add 1 pint carbolic acid, mix thoroughly, slake enough lime in 4 gallons water, so that when added, a thick whitewash will result, then add ½ lb. paris green, mix thoroughly. The latter is probably the best. Valuable only to prevent egg laying on bark.

Fumigation. Most valuable for young nursery stock and for grains. Cyanide of potassium (98 per cent. pure) 1 oz., best grade commercial sulphuric acid, 1 oz. by measure, water 3 oz. by measure, these amounts for 150 cubic feet space, expose trees at least one-half hour. Prepare tight chamber, mix acid in water by pouring acid slowly, stirring frequently, into the water. Use earthen or glass vessels, and drop cyanide into the diluted acid, closing chamber at once.

Carbon bisulfid 1 lb. to 1,000 cubic feet space, place in shallow dishes near *top* of chamber.

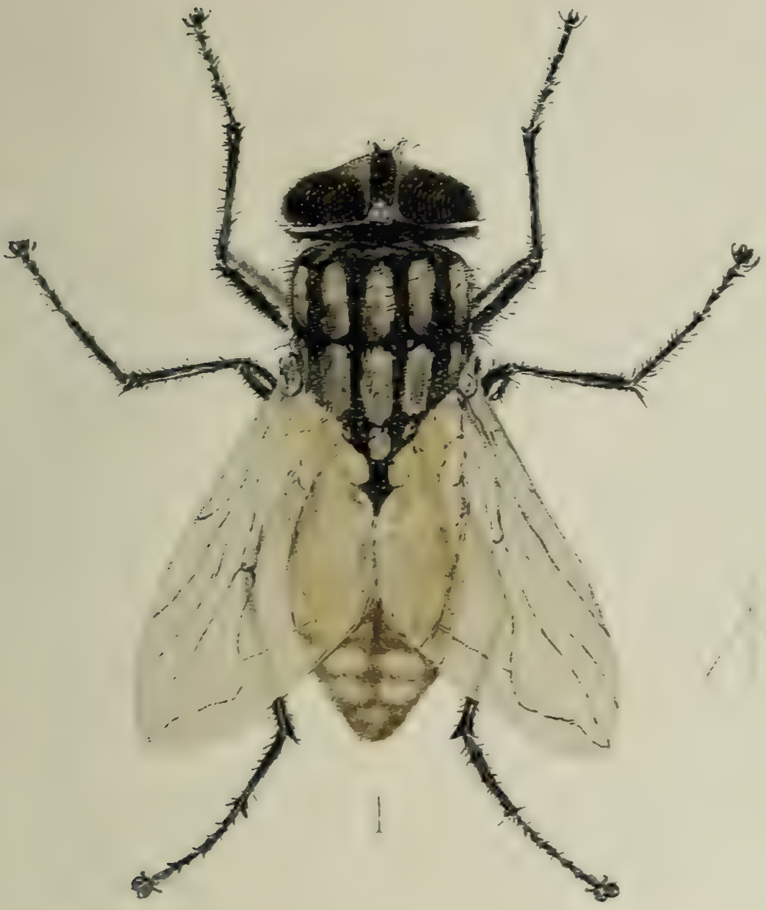
These substances are deadly poisons, the acid will corrode or eat many things, carbon bisulfid is inflammable and explosive in the presence of *any fire. Handle all with extreme care.*

Household Insects.

By Dr. E. P. Felt, New York State Entomologist.

Country houses are the pleasantest on the face of the earth. The person dependent for a living on the profits obtained from the farm may not have a residence quite equal in some respects to the country houses of the wealthy, yet there is no reason why it should not be clean, comfortable and a very enjoyable spot. Such, I am glad to state, is the condition of many farm houses. The presence of almost any insect in the home is troublesome to the housewife and frequently to other members of the family, and when any one species occurs in large numbers, comfort is seriously marred. The farm house is usually distant enough from others so that there is little danger of neighbors supplying us with household pests, and even the greater portion of the house flies probably have origin on our own farms. A serious disadvantage in city life is the closeness of houses one to another. Almost all kinds of household pests have no difficulty in passing from one to another, while a nearby stable may produce enough flies to supply the entire neighborhood. There is hardly any excuse for such conditions existing in the country, and yet I have been in places where one might almost suppose the house was built to accommodate the flies. They certainly took possession of everything.

Mosquitoes.—A large proportion of farm houses are more or less troubled with these tiny pests. We all know that they can be excluded by the use of screens at doors and windows. Is it not practicable sometimes to go behind this and prevent their production? It is well known that mosquitoes breed in pools and some may have seen the black or dark colored, boat-shaped egg masses floating on the water. In about sixteen hours the



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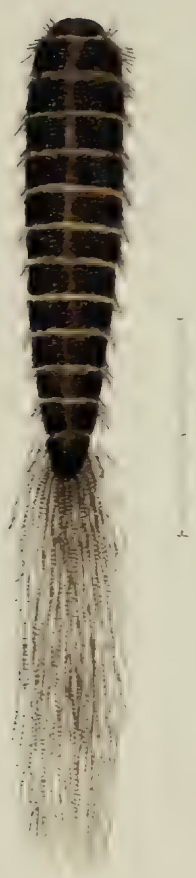

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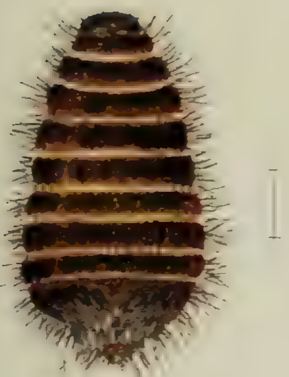

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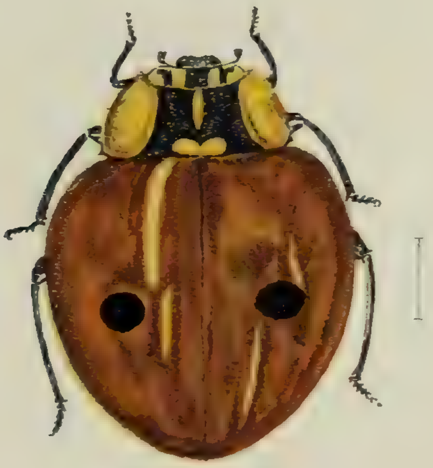

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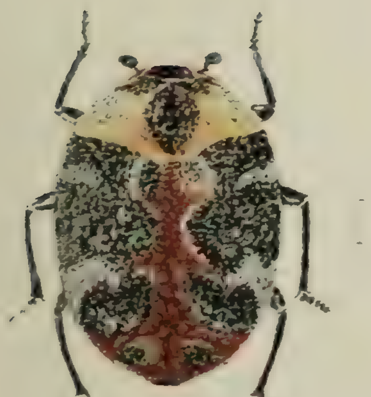

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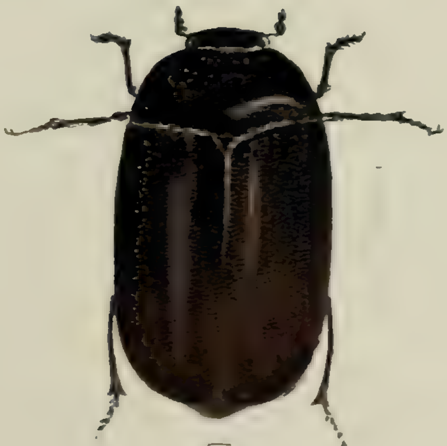

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House Fly and Carpet Beetles.

eggs hatch and the young wrigglers begin their active life in the water, and then require only about seven or eight days to complete their growth. Next they change to the curious pupa and about two days later the perfect insect emerges. It requires but 10 to 15 days for this insect to complete its life cycle, and the short time necessary for this explains the production of enormous swarms of these winged pests as the season advances, specially when it is remembered that each female may produce from 200 to 400 eggs. Mosquitoes breed, as most of us know, in comparatively still water, and in many places areas of this kind are somewhat limited or else can be reduced materially without much trouble. In many cases the supply of mosquitoes may come from a water barrel just outside the door or from near by pools. If not practicable to do away with these by drainage, it is still possible to prevent to a large extent the production of the insects. The experiments conducted by Dr. L. O. Howard, chief of the Division of Entomology of the United States Department of Agriculture, have shown that kerosene applied at the rate of one ounce to every 15 square feet of surface and renewed monthly is a most efficient preventive of the breeding of mosquitoes, and one that is practicable when the area of still water is somewhat limited, as is the case in many localities. Kerosene can be applied to tanks or cisterns containing drinking water without unpleasant results, provided the water is drawn through a pipe from below the surface. This method is at least worthy a trial in many places. Kerosene applied in like manner to pools frequented by gad or horse flies has resulted in the destruction of many of these annoying pests, and a trial of it is recommended.

House Fly.—This is one of our commonest pests (plate 5, figure 1) and its presence in large numbers in the home has too often been taken as a matter of course and no attempt made to mitigate the trouble. We all know that the flies can be excluded from a house to a great extent by the use of screens, but if the creatures can be prevented largely from multiplying, the evil is stopped at its source. It has been found that our common house fly breeds in large numbers in horse manure and also to some extent in dooryard filth, but the former substance appears to be preferred by this pest. One fly can deposit about 120 eggs which hatch in approximately eight hours. The maggots grow rapidly and in about ten days transform to adult flies. The short life cycle and prolificacy of this insect account most fully for its enormous numbers in hot weather.

In many places it would appear that comparatively little effort would prevent the breeding of the flies to a considerable extent. Either the manure could be spread on the fields daily, as recommended by advanced agriculturists, or a dark shed or cellar could be provided for its reception. The first method would result in such rapid drying of the manure that the flies could not mature. It is not usually very much trouble to inclose a shed or cellar so it will be too dark for the flies to enter, and this plan would therefore result in reducing the numbers of the pests very greatly. With the manure properly cared for and out of reach of flies, and a little cleaning up of other places offering favorable conditions for multiplication of these insects, the fly nuisance would be abated to a very great extent.

Fleas.—It occasionally happens that a shed or room in a house becomes infested with these pests. They most likely owe their introduction to the pet dog or cat. The eggs of this insect are deposited among the hairs of its host, but not fastened, so they soon drop to the ground and naturally are most abundant about the sleeping place of the animal. The young emerge from the eggs in about one day, and live in dust and refuse occurring on the floor or in crevices. They require seven to fourteen days to complete their growth, then spin a slight cocoon, and about five days later the jumping adults come forth.

The young do not develop successfully in places where they are frequently disturbed, and the necessary lack of sweeping when a house is closed for the summer is probably the cause of the rather frequent reports of such dwellings being overrun with these pests when the family returns. On general principles it may be assumed that the presence of this pest in numbers indicates some favorable, undisturbed breeding place in the immediate vicinity. Frequent brushing and cleaning, supplemented in some instances by the use of fresh pyrethrum powder, benzine, kerosene emulsion or other contact insecticide, will soon stop the breeding of these pests, but may not kill the adults as they are quite resistant to such substances. Where practicable, the adult fleas may be reached by fumigation with sulphur or hydrocyanic acid gas. The latter is very dangerous and the greatest care should be exercised when it is employed.

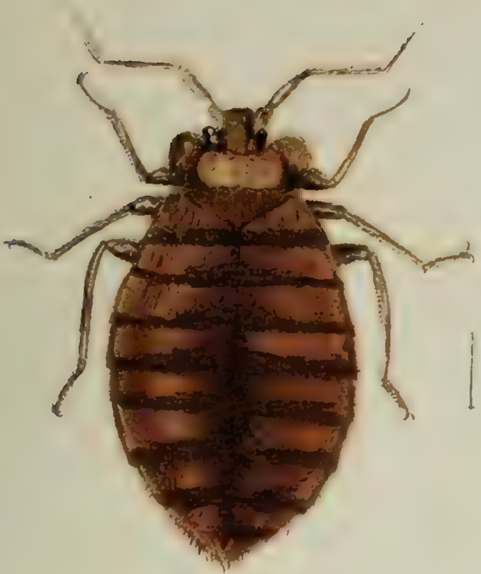
Carpet Beetles and Clothes Moths.—There are two species of carpet beetles commonly found in houses, the Buffalo carpet beetle, *Anthrenus scrophulariæ*, and the black carpet beetle, *Attagenus piceus.* The hairy, shaggy larva (plate 5, figure 2) of the former species is pretty well known to the housewife. The parent insect is a small oval beetle about one-eighth of an inch long and prettily marked with red and white on a black background, as represented at figure 3, plate 5. The larva of the black carpet beetle is easily recognized by its slender form and tail of long hairs, plate 5, figure 4. The parent insect is similar in shape to the preceding species, but is a dark brown or black, plate 5, figure 5. The artist has also represented a two-spotted lady beetle (plate 5, figure 6), an insect which is frequently taken for a carpet beetle. This pretty lady beetle and others of its kind are beneficial and should be protected. If they can be recognized in no other way, remember that the under side of the lady beetle is nearly flat, while both carpet beetles are very convex and hence will readily rock when placed right side up on a level object, unless their legs are extended.

Before passing to a consideration of remedies, the clothes moths will be briefly noticed. There are several species attacking clothes. Their work is familiar to almost everybody and in a badly infested house it is by no means uncommon to see the delicate moths flying about the rooms. The larvæ, as is well known, show a marked preference for woolen and fur goods.

The young of all these insects do not like light, air and disturbance. Hence one of the best protective measures, particularly for garments, is brushing and airing from time to time, specially in the summer months. It is usually more satisfactory to take up badly infested carpets, beat and air them thoroughly and, in cases of a bad infestation, spray them with benzine. The room should be thoroughly cleaned and if there are cracks in the floor, it is advisable to fill them with plaster of paris. As a further preventive, the carpet may be laid on tarred paper or else replaced with rugs. Clothes or other articles put away for the summer can be protected in the following manner: Brush well so as to be sure no eggs or larvæ adhere and then lay away in large pasteboard boxes, such as may be procured at a dry goods store, put in some napthaline balls, camphor or similar substance and then seal the cover with a strip of gummed paper. The boxes cost little and if the work is thoroughly done there is no danger of injury by these pests. This method is one recommended by Dr. Howard. He has also found that these insects are not active at a temperature lower than 42° F, and hence storage of valuable furs, etc., at a lower temperature than this may be considered a safe and practical method of preserving them from insect injury.

House Ants.—Several species annoy the housekeeper very much at times. The worst of them all, where it occurs, is the little red ant, *Monomorium pharaonis*, an insect so small that it can hardly be excluded from any vessel. It is represented much enlarged at figure 4, plate 6. As is well known, ants live in nests in soil and not infrequently they establish themselves in underpinning or walls of houses. Whenever possible, seek out the nest and destroy the occupants by a liberal use of boiling water, kerosene emulsion, or strong soapsuds. More effective than these substances is carbon bisulfid, which may be used in the following manner: With a broomstick or bar make some holes in the nest several inches from each other and a few inches deep, pour in each about a teaspoonful of carbon bisulfid, cover the nest with a wet blanket and after a few minutes explode the fumes collected underneath with a match on the end of a short stick. Unfortunately, it is not often possible to get at the insects in their nests and then we must resort to the laborious trapping with a sponge moistened with sweetened water and dropping the collected pests

PLATE 6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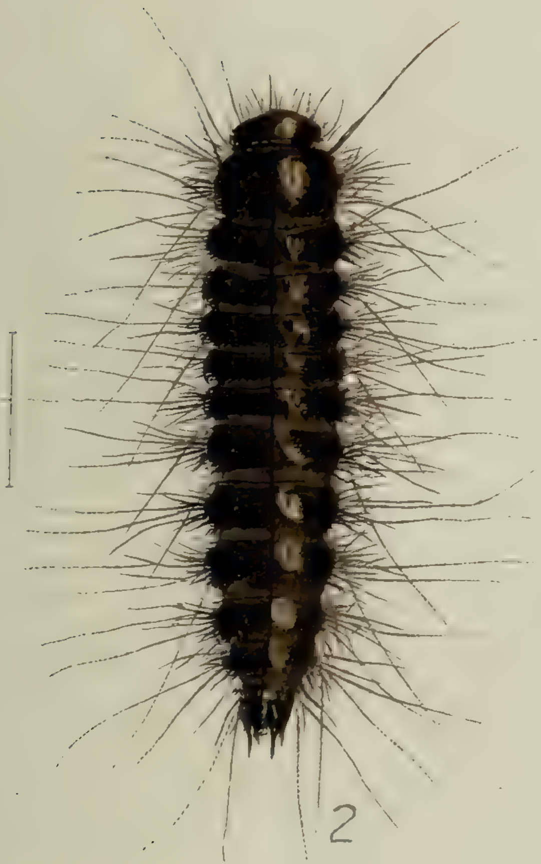
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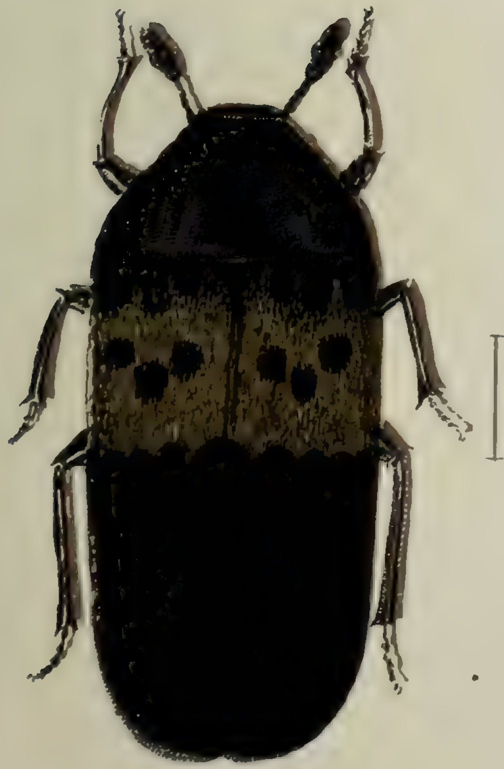
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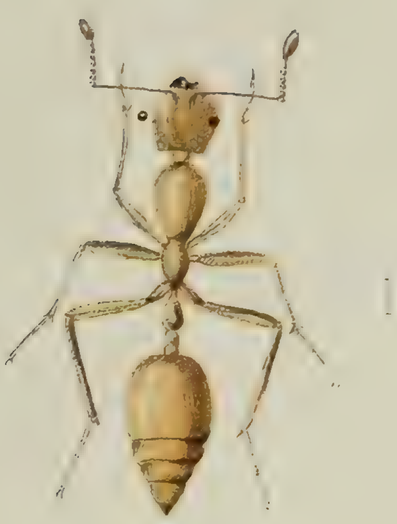
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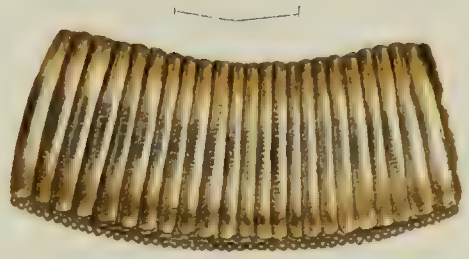
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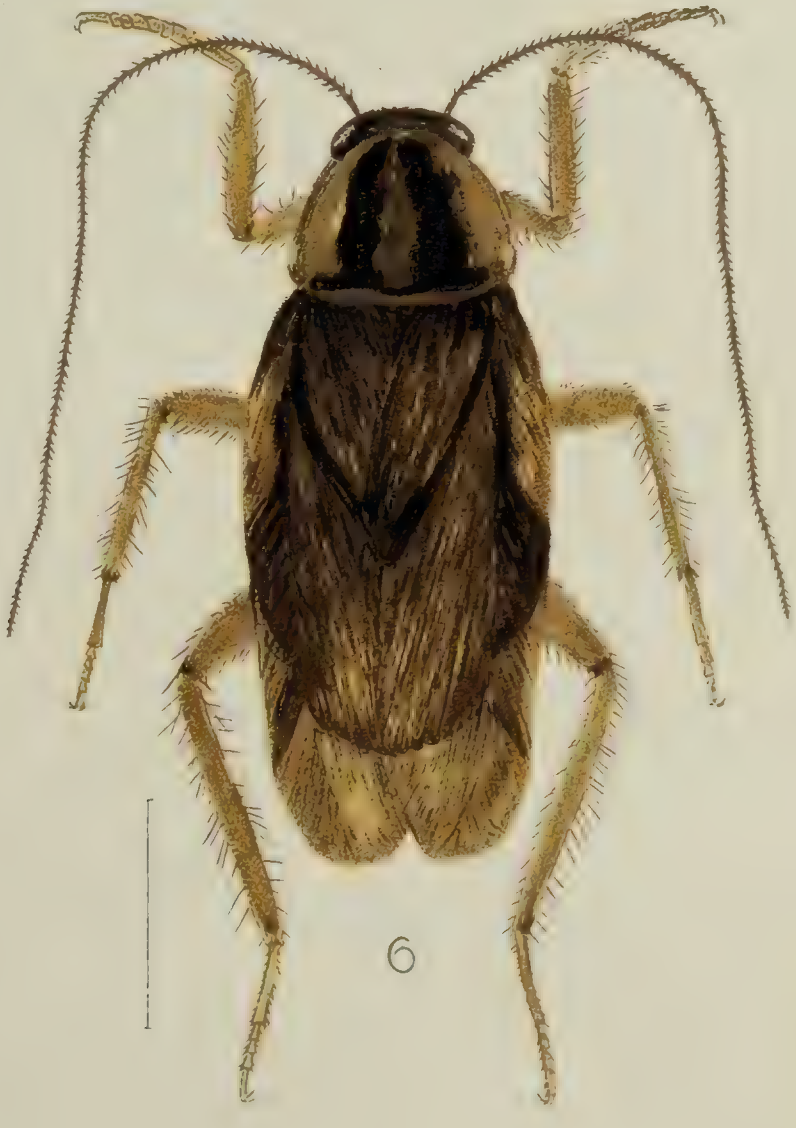
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Household Insects.

into boiling water. Lard or fat may be used as a bait and then burned after it has become well covered with the insects. A syrup made by dissolving borax and sugar in boiling water is said to destroy ants in large numbers. This should be preceded when practicable by the removal of other attracting substances. The above measures would prove of value in case of infestation by other species of ants.

Cockroaches.—There are two species commonly found in houses, particularly in cities, the smaller, light brown croton bug, represented at figure 6, plate 6, and the larger brown or black cockroach. The egg capsule of the former is shown at figure 5 of plate 6. Both species prefer the vicinity of water pipes, sinks, etc., and if abundant anywhere in a house are to be found somewhere about the kitchen. They subsist on almost any article of food, but it is not so much what they devour as their disgusting odor, etc., that render them objects of abhorrence to the housewife. The croton bug is more wary than the other species, which latter can be enticed to vessels of stale beer and if sticks be arranged so the creatures can easily get over the perpendicular sides of the vessel and be obliged to drop a little distance in order to get at the liquid, many can be trapped in that manner. Sugar and paris green well mixed and placed about their haunts will soon diminish their numbers greatly, but paris green is a dangerous poison and can not be used with safety where there are children. Hooper's fatal food is said to be nonpoisonous and it has proved itself thoroughly effective in a number of places. Prof. J. G. O. Tepper, Adelaide, South Australia, recommends a mixture of one part of plaster of paris and three parts of flour, with water near by. The roaches are said to eat the mixture, drink the water and die in a short time. The insects are said to disappear in a few weeks. This is not expensive and is certainly worthy a trial.

Bedbug.—It is almost impossible to prevent one of these creatures from occasionally making its way into the home, particularly is this true where many guests are entertained or members of the family travel to a considerable extent. Once in a while a family is so unfortunate as to move unwittingly into a house infested with this pest. The insect, represented much enlarged at figure 1, plate 6, has probably a slight acquaintance with most of us. The white, oval eggs are laid in batches of from six to fifty in cracks and crevices, as stated by Dr. Howard. They require from seven to ten days to hatch and the life cycle is completed in about eleven weeks.

The use of iron or brass bedsteads is to be recommended because they afford so little shelter to the pests. Where large wooden bedsteads are used, the crevices should be liberally treated with benzine, kerosene or corrosive sublimate solution. Hot water, where it can be employed without injury, will kill eggs and bugs. This treatment must be supplemented by daily inspections and the destruction of all specimens found. Fumigation with sulphur is reported by some as effective, but others state that it has no value. Treatment with hydrocyanic acid gas would probably be very effective, but it must be used with great care, and there is danger of killing mice and rats in the walls or under the floors and the resulting annoyance. Though red ants are household pests, they are said to wage warfare on bedbugs. The cockroach is also credited with the same useful habit, but unfortunately neither of these species can be considered desirable acquisitions from the housekeeper's standpoint.

Larder Beetle.—The larva and the adult are represented on plate 6, figures 2, 3. This insect occurs in museums and attacks many animal products like hams, bacon, other meats, horn, hoofs, skins, beeswax, etc About six weeks are required to complete the life cycle under favorable conditions The contents of infested rooms should be cleared out and the room fumigated with carbon bisulfied or hydrocyanic acid gas. Infested portions of meats should be cut away and the surface of the remainder washed with a diluted solution of carbolic acid. The parent insect can be excluded from a store-room by the use of screens.

Cheese Skipper; Ham Skipper.—The insect is well-known to many in the larval or skipper form though few may be acquainted with the parent fly. This insect is usually found in the best

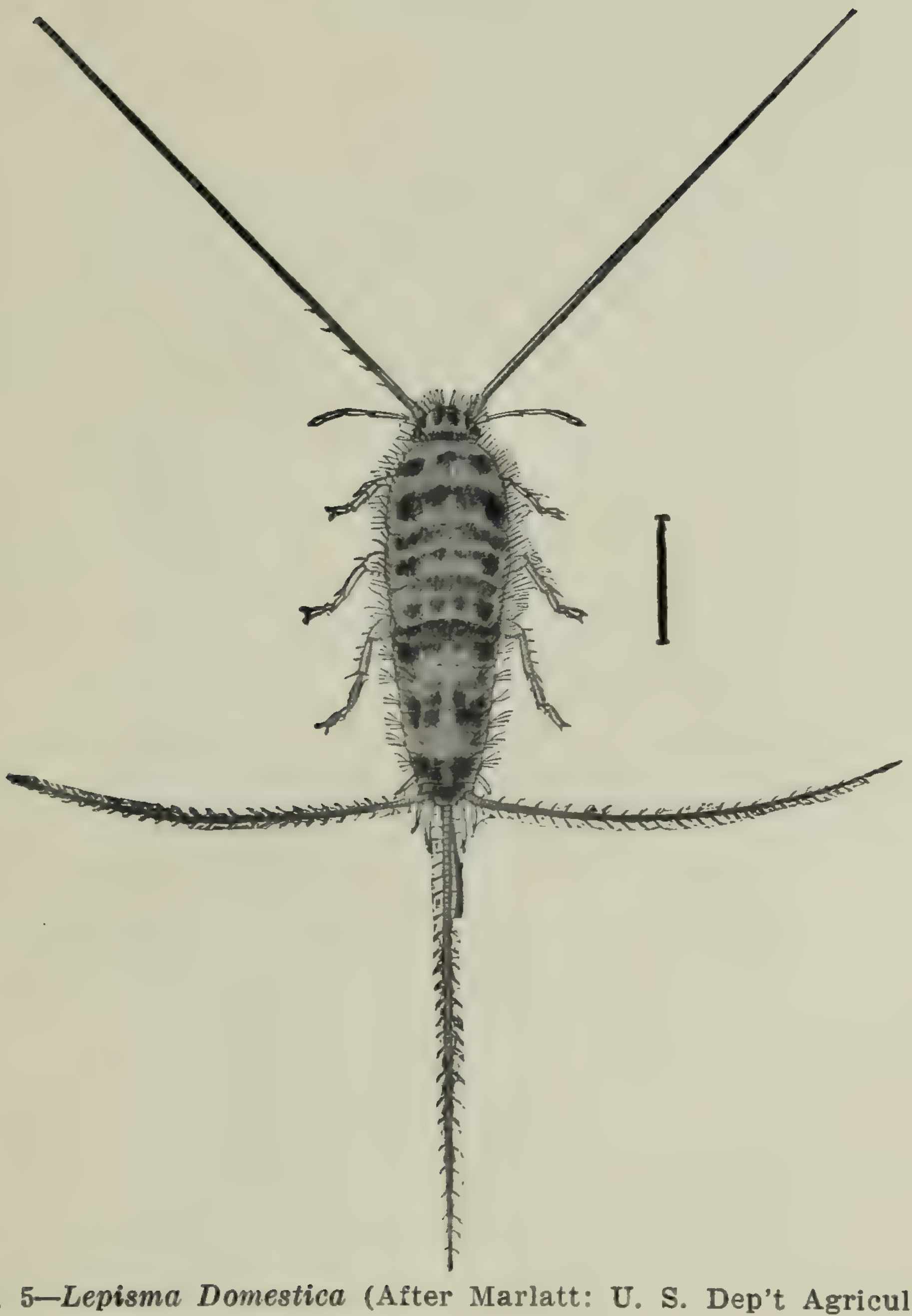
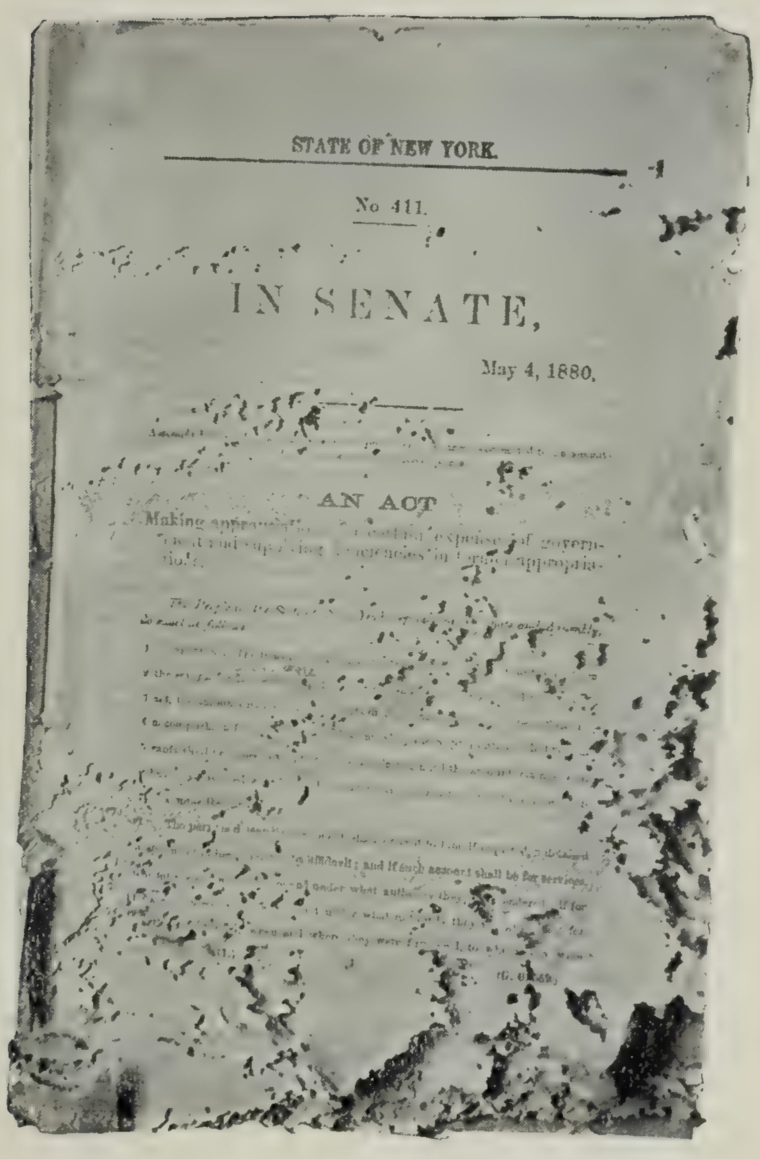


FIG. 5—*Lepisma Domestica* (After Marlatt: U. S. Dep't Agricultur Division Entomology, Bulletin 4).



STATE OF NEW YORK.

No. 411.

IN SENATE,

May 4, 1880.

AN ACT

Fig. 6—Work of Lepisma (original).

cheeses and it is considered a good judge of this dairy product. The parent fly is smaller than the common house fly and like it prefers daylight. As the skippers do not cause putrefactive changes, only the portions actually infested need be cut out and destroyed. The flies may be kept away by darkening the room and also by the use of fine screening, a 24-to-the-inch mesh is said to be fine enough. Scrupulous cleanliness and daily examinations in cheese factories will prevent the fly from doing much damage. The insect also attacks hams and has been recorded as breeding in bacon.

Fruit Flies.—The housewife is troubled sometimes by small maggots in preserves. They are also found in decaying and fermenting fruits. Apple pomace produces them in swarms. Cider, vinegar and allied substances are also agreeable to the insect. The small flies deposit eggs which soon produce maggots. Not infrequently the eggs are placed on the side of a preserve jar and the little creatures work their way through an almost imperceptible crevice into the jar. Preventive measures are found in more perfect sealing of preserves and keeping them and other attractive substances in the dark, if the flies are at all troublesome. Well fitting, fine screens will exclude the insects from a house.

Bristle Tail; Fish Moth.—Another insect in the so-called slide, silver fish, bristle tail, fish moth, a small form frequently occurring among undisturbed papers, starched goods, etc. This insect, *Thermobia funorum*, is shown much enlarged at figure 5, and an interesting example of its work is represented at figure 6. Dampness is favorable to its existence. It succumbs readily to fresh pyrethrum powder and ordinarily does not cause much damage, unless articles it likes are left undisturbed for years.

(The assistant to the state entomologist, Mr. Charles S. Banks, attended a number of farmers' institutes and presented substantially the same matter as that given in the two preceding papers on insects.)

Explanation of Plates.*

PLATE 1. APPLE TENT CATERPILLAR (*Clisiocampa americana*).

Fig. 1. Eggs, enlarged.

Fig. 2. Dorsal view of caterpillar, enlarged.

Fig. 3. Nest of partly grown caterpillars, reduced.

Fig. 4. Cocoon, much enlarged.

Fig. 5. Moth, enlarged.

Fig. 6. Cocoons in fence corner.

PLATE 2. FOREST TENT CATERPILLAR (*Clisiocampa disstria*).

Fig. 1. Eggs, enlarged.

Fig. 2. Dorsal view of caterpillar, enlarged.

Fig. 3. Pupa, enlarged.

Fig. 4. Cocoons within maple leaf, reduced.

Fig. 5. Moth, enlarged.

PLATE 3. CODLING MOTH (*Carpocapsa pomonella*).

Fig. 1. Apple showing work of larva, natural size.

Fig. 2. Hibernating cocoon of larva under a piece of bark, enlarged.

Fig. 3. Moth at rest, very much enlarged.

Fig. 4. Moth with wings spread, very much enlarged.

PLATE 4. CODLING MOTH.

Fig. 1. Larva, very much enlarged.

Fig. 2. Pupal case, very much enlarged.

Fig. 3. Apples just right to spray, slightly reduced, note open calyx lobes.

Fig. 4. Too late to spray, slightly reduced, observe the closed calyx lobes.

PLATE 5. HOUSE FLY AND CARPET BEETLES.

Fig. 1. House fly (*Musca domestica*), very much enlarged.

Fig. 2. Larva of Buffalo carpet beetle (*Anthrenus scrophulariae*),

Fig. 3. Adult of same, very much enlarged.

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* Drawn and colored from nature under the author's direction by Mr. C. S. Banks.

Fig. 4. Larva of black carpet beetle (*Attagenus piceus*), very much enlarged.

Fig. 5. Adult of same, very much enlarged.

Fig. 6. Two spotted lady bug (*Adalia bipunctata*), very much enlarged.

PLATE 6. HOUSEHOLD INSECTS.

Fig. 1. Bed bug (*Acanthia lectularia*), very much enlarged.

Fig. 2. Larva of bacon beetle (*Dermestes lardarius*), very much enlarged.

Fig. 3. Adult of same, very much enlarged.

Fig. 4. Little red ant (*Monomorium pharaonis*), very much enlarged.

Fig. 5. Egg mass of Croton bug (*Phoyllodromia germanica*), very much enlarged.

Fig. 6. Croton bug, very much enlarged.

Tile Drainage.*

By H. E. Nicolai of Big Bend, Wis.

To lay down a specific rule of tiling would be an impossibility for any one, as different lands and conditions would vary the cost of drainage both as to the number of drains required, the amount of labor expended in digging, and also the size of the tiles used.

Different Treatment for Different Lands.

I have one piece of border land containing fifteen acres, in which the drains are from four to five rods apart, and the drainage is perfect, while in another piece of only half the size, the drains were put four rods apart and proved to be insufficient to drain the land thoroughly. The former piece is a black sand loam, underlaid with sand and clay, while the latter was a boggy marsh, full of small springs. The top soil was muck, underlaid with clay and gravel. The drains had to be doubled wherever the ground was springy, making them only two rods apart, and the depth of the tiles is about four feet. The cost of this piece was about $30 per acre, while the former was only $10 per acre. Both pieces have been in cultivation ever since they were drained, about ten years ago, and have produced wonderful crops. The average cost per acre of tiling a wet marsh is about $20.

The most profit in tile draining is derived in fields that have small basins in them on the elevated parts of the fields, which fill with water during the spring and keep the lower levels of the fields wet and cold until the water evaporates in the basins. One drain with a few laterals in the basin will usually be enough in fields of this kind, and the cost will be very small when compared with the benefits derived from them.

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*A paper read before a farmers' institute in Wisconsin and the discussion following.

The benefits to be derived from the drainage depend largely on the location, the value of the land, and what crop the land is used for. As no two fields present the same condition, except level marshes, one must rely upon his own judgment, according to the condition and location of the land.

How to Tile Drain.

First ascertain how much fall there is in the land to be tiled, from the upper end to the outlet. If there is a gradual fall from source to outlet, no survey is necessary, but if the land is nearly level, or if there are any depressions or basins, so that it is hard to determine the amount of fall, obtain the services of a competent engineer to determine the fall from the upper end of the outlet. The fall should be divided up by setting stakes every hundred feet and drawing a level line from these stakes. The stakes should be driven close to one side of where the ditch is to be dug. The fall can then be divided by measuring from the line to the bottom of the ditch. From one-fourth to one-half inch of fall to the rod is enough, and in large tiles less fall will do.

Digging the Ditch.

Commence at the outlet to dig the ditch. If the banks of the ditch have a tendency to cave, the tiles should be put in as fast as the ditch is dug; but if the banks stand firm, it is better to commence laying the tiles at the upper end, after the whole ditch is completed. The lower part of the ditch should be dug with a tile spade, the bottom cleaned out with a tile scoop, and the tiles laid with a tile hook.

The tiles should be covered with loose soil to the depth of twelve inches. This can be done by breaking down the top of the bank on both sides of the ditch, after which the filling of the ditch can be done with the horses and plow, care being taken not to let the horses get into the ditch and disturb the tiles.

Cost of Tiling.

I will give you a description of a piece of land which I tiled eleven years ago, and also the expense of tiling it at that time. The piece in question consisted of about an acre, covered with water the greater part of the time. Surrounding this water were about four acres of land grown to willows and rushes, also under water during wet seasons. Surrounding this last strip are about four acres of what is usually known as border land (too wet to plow and not wet enough to be called marsh), making about nine acres in all. It was worth, for grazing purposes, at the outside figures, not more than $40 per acre. The expense for draining it was as follows:

2,960 2½-inch tiles at $10 per M	$29 60
1,136 3-inch tiles, at $12.50 per M	14 20
432 4-inch tiles, at $16 per M	6 91
512 6-inch tiles, at $25 per M	12 80
Total	$63 51
10 per cent. discount for cash	6 35
Leaving total amount paid for tiles	$57 16
315 rods of ditch, at 30c. per rod	94 54
Hauling tiles from factory	15 00
For making dike and open ditch	10 00
Total cost for 9 acres	$176 66
Cost for one acre	19 62

This land, worth $40 per acre, and costing $19.62 per acre for draining, cost $59.62 per acre. The real value of the land now is $100 per acre.

This basin was the receptacle of a great deal of surface water from a neighbor's farm, and, to prevent it from being flooded during the heavy rains, I dug an open ditch on the upper side to a point beyond the natural outlet of the basin, putting the earth from the ditch on the lower side for a dike. It requires a little repairing every spring, but aside from that it has worked to perfection.

The crops raised on this piece of land the past few years have been the admiration of the whole neighborhood. The crop this last year was a fair yield of early Ohio potatoes, followed by a heavy crop of fodder corn, which, in turn, was followed by winter wheat. At the first of the year the wheat was in good condition, but of course it is now killed, owing to the severe winter.

Another Experiment.

My last experiment was on fifteen acres of border land along the Fox river. It was too low to admit of any fall to the river except when the river was very low. I dug an open ditch, six feet wide at the top, two feet at the bottom and three feet deep, along the lower side of the piece to be drained, to receive the water from the tile drains. The earth was all put on the river side of the ditch for a dike, to prevent the water overflowing the land in case of high water. I also dug an open ditch from the river to the dike, connecting it with the first open ditch by means of a flume, which passes under the dike and can be opened or closed, as the case may require. When the river is low, I keep the flume open; when it rises so as to set back into the open ditch, I close the flume to prevent its filling the ditch, and what water collects in the ditch can be pumped out over the dike.

In this way any level marsh can be reclaimed, and it need not cost more than $25 per acre. The larger the piece drained, the less the expense per acre for diking and pumping. The following hints will be useful to those inexperienced in tiling.

Practical Suggestions.

First, get the fall of the land, and then lay the drains in a systematic way. Never lay the tiles less than three feet deep; four feet is better. If tiling is let by the job see to it that it is done according to agreement, and always inspect the work before the tiles are covered.

Put a wooden box at the end of each tile drain where it discharges into an open ditch, but have as few open ditches as possible.

Use 2½-inch tiles in all laterals for the first six or eight rods, and for a longer distance, if there be plenty of fall. Half an inch of fall to the rod in the laterals, and one-quarter of an inch in the main ditch, is sufficient, although more fall would be better, as smaller tiles could be used. The main ditch should be dug a little deeper than the laterals, so as to join the laterals near the upper side of the tiles in the main ditch.

Later Treatment.

If your land should not produce anything the first or second year, do not get discouraged, but give it a coat of wood ashes or barnyard manure, and you will be astonished to see what crops it will produce.

If your drain will discharge its water on a neighbor's land below you, get his consent first, as you have no right to flow any more water on his land than there is naturally flowing over the surface. Remember this fact will save hard feelings, and sometimes a lawsuit.

Discussion.

Question.—How do you pump at that place?

Mr. Nicolai.—I have a tread power, but the seasons have been so dry and there is so little surface water falls on the land that there are very few seasons that you need to pump; in fact, I have never had any pumping to do since the first year that I put in the tile, and I have taken out the pump and used it for other purposes. When you have to do permanent pumping, a good large wind-mill, or two of them, would be the cheapest.

The Chairman.—I did some tile draining on my farm about fourteen years ago, I think. When I commenced working at it, a neighbor was going by, and he says: "What are you doing?" I answered: "I am putting some tile drains in the ground." And he says: "That costs money. If you have money so plenty that you can afford to bury it in the ground, you better let me have it; I can make good use of it." But the next year and the next year after, when he went by there and found magnificent crops of corn, such as he had never seen on my farm before, he went to tiling, and he has buried four times as much money as I did.

Mr. Briggs.—In a very heavy clay soil, how close together would you have to put the tile, and how deep?

Mr. Nicolai.—Where it is very stiff clay I would put the tile down two rods apart and four feet deep, if you can get them down so deep—if they have fall enough.

Mr. Briggs.—Will the water ever soak down to them?

Mr. Nicolai.—Yes, if they are covered with loose soil first.

Q.—Don't you put something over before you put on the loose soil?

Mr. Nicolai.—No. If it is quicksand, I put marsh hay or straw over it, simply to keep the sand from coming in after I have covered it. Quicksand won't run unless there is some water. I have taken up tiles that were laid in quicksand when I put them in trenches where it was too wet, and in all the tiles I have taken up I never found a tile filled with sand. If they are laid properly, so there is a gradual fall, what little sediment runs in at the joints the water will continually carry out at the outlet.

Q.—Suppose the land is blue clay. Would you put the tile down four feet?

Mr. Nicolai.—No, I don't think it would be any advantage.

Mr. Arnold.—It would not be worth draining if it were blue clay, would it?

The Chairman.—Yes, it would. I know of some land that is blue clay land with a little black soil on top of it.

Mr. Nicolai.—I would take that little black soil and shove it down on top of the tile and fill the trench up with mixed blue clay and black soil; that will drain it off in good shape. It is the black soil that furnishes the good drainage above the tile.

The Chairman.—Many people are skeptical about this thing, just as I was. I had read a great deal about tile draining, about how much good it would do to land, and when I commenced digging a ditch through some blue clay, I said: "I don't see how it is possible for the water to get through that. It is no use; it can't draw from each side." But it did; but not until the ground had once been frozen, and after it had been frozen twice, it did still better. I looked at it like this, that the land is not so impervious but that it gets full of water, and when it freezes it expands. It commences to thaw out from below, making little channels through the clay, and the clay being released, it doesn't pack down so solid as it did before, so it is much better each year.

Q.—Do you understand that the soil thaws out from underneath?

The Chairman.—Yes, sir.

Mr. Nicolai.—It thaws out from both sides. But I will give another explanation in regard to loosening the clay soil. You all know that angleworms will not work in water, but just as soon as you dry out the water, and give them a chance, they will work over the soil to the depth of the water, and in that way I think the clay soil is helped very much.

Mr. Wing.—I am glad to hear you speak of the angleworm, because we have what we call exhausted soils in Ohio. They have become tough and hard, and in those soils the angleworm helps us after we have put on some manure. Of course, we do not find them in the clay, but after the manure is put on, the humus gets down, and they work through.

Q.—Do you think there is any truth in the theory that high, gravelly ground can be benefited by drainage in dry seasons?

Mr. Nicolai.—It depends on what your high ground is. In land where the surface soil is underlaid with sand or gravel, as natural drainage, you cannot benefit by tiling, but heavy clay soil can be benefited by drainage. It depends on where your land is located, what the value of it is, etc., as to whether it is profitable.

Mr. Wing.—Would you think it necessary to give a quarter of an inch fall to the rod, if you don't have that much?

Mr. Nicolai.—No, I stated that less fall may do.

The Chairman.—One inch to the hundred feet will do, if you have fine work enough.

Mr. Arnold.—In tiling, will the siphon principle work—is it tight enough?

Mr. Nicolai.—Yes, in clay land, you can get it tight enough to draw out water, but it won't do you any good. You let in the air, and it will spoil your crop before you can get the water out. I have seen it worked in tiling with clay.

Q.—Didn't you find it essential to lay the tile so that there will not be any depression where the water will fill up?

Mr. Nicolai.—I never laid any where I had depression in the tile.

Mr. Wing.—In Ohio, when we trusted to the colored brother to lay tile, he would have a low place in the ditch and the water would stand clear up; if you don't see it in time you will have to dig it out. It does not hurt so much where there is a strong current, but where there is just a little shower that will carry in a little earth, after a while it will harden there and fill it up.

The Chairman.—You don't want any willow, cottonwood or elm trees growing near your tile. They will get in through the small openings and obstruct it.

Mr. Nicolai.—Hadn't you better include all trees?

The Chairman.—Maybe, but oak won't bother.

Mr. Arnold.—Is not underdraining just as good where it is made out of stone as out of tile?

Mr. Nicolai.—Yes, but it is a great deal more expensive. The first drainage I did was of stone, and it cost me about a dollar a rod, but it was done in good workmanlike manner, so it is a good drain to-day, and I think it was put in eighteen years ago; before we had any tile factories in our section.

Mr. Wing.—Hasn't that drain got lots of fall?

Mr. Nicolai.—No, it has no more fall than my tile. I don't think more than half an inch to the rod, and some places not that much, but I can tell you how I put it in. It was a low, boggy marsh; I dug a ditch four feet deep and a little over a foot wide at the bottom, so that I could get two good-sized stones, one on each side; then I covered it with large stones on top, and filled it with gravel, chinking it on the sides for about a foot, making it tight; then I used boards in the bottom to put my stones on, so they would not slip in the mud, and after the water got thawed, it run a nice stream of water. During the dry season this winter it has run a nice stream of water.

Supt. McKerrow.—Do your tiles run water in cold weather?

Mr. Nicolai.—Yes, sir; most of my tiles are running water now. Of course, most of my ground is springy. On most land there is no water to run only in the spring of the year.

The Chairman.—Now we will suppose there is some marsh land running by the side of the hill (highland), and we know that along next to the highland the marsh is apt to be the wettest. Now, how would you run your tile—parallel with one side of the hill, or run it right down through the marsh to the creek, forty rods from there?

Mr. Nicolai.—I would run it parallel with the hill.

The Chairman.—That is the way I did, and it dried the land for twenty rods beyond it; just cut off that spring water.

Mr. Nicolai.—Springs are frequently cut off in that way, and it will save a great deal of tile. It will make dry land out of small fields which are kept wet by the seepage of these springs over the land.

The Chairman.—I want to say, just as Mr. Nicolai did, that if it is going to cost more to tile the land than the land is worth, of course it won't pay to tile it, but even in such cases a man may have a wee spring running diagonally through a field, and it may pay him a great profit to tile it. That was some of the first work I did. I had a field of twenty acres that was cut in two diagonally by a spring, resulting in all five acres of wet land. I run a tile through the whole field, so I could plow it. It worked splendidly, and after one has commenced to tile such places as that, he will see other places, and he will keep on until he makes a garden of his whole farm.

Mr. Nicolai.—I have had the same experience as Mr. Goodrich, in regard to my neighbors accusing me of throwing away my money; also in regard to the fact that after I commenced to tile I did not stop until every foot of my land that needed it was tiled. I have tiled about sixty acres now, and I have noticed that all the men in our section, after they have once commenced it, can not find a stopping place until every foot is dry, and that is very good evidence that it pays.

Mr. Wing.—I have a neighbor who began laying tiles, and his father thought he was crazy. He came out from town afterwards and saw the crop of clover and the wheat growing on the land, and he turned the tables on the boy. He says, "Joe, this ought to have been done long ago."

Mr. Nicolai.—There is one very great advantage with tiled land, and that is its early use in the spring. I notice that my tiled land is ready to work a great deal sooner than ordinary upland, because the tile is at work all winter where there is no frost underneath, and just as quick as the frost is out, your land is dry and you can go right to work on it and put in your crop.

Mr. Arnold.—Have you ever had the water analyzed from these drains to find out whether it is taking off any fertility or not?

Mr. Nicolai.—I never have, but I am convinced that it does, in certain cases.

Mr. Arnold.—How would you stop that?

Mr. Nicolai.—I don't know that I could stop it, nor could I stop losing some of the fertility under any circumstances. I am one of those who believe in manuring in the fall or winter, or any other time that it is convenient, to get it on the land as quickly as possible, spread it on brodcast, and in that condition I am going to lose some of the fertility anyhow.

Mr. Arnold.—Don't you believe if you have a growing crop on the land there would be less loss than without any.

Mr. Nicolai.—There wouldn't any crop grow just now. There is a chance as soon as the water gets out of the land. I know of one place where the basins were all filled up with water two weeks ago, and it has all sunk away, the land is dry, and if there was any manure scattered on the top and soaked up in the water, some of the fertility is gone; but I would rather lose a portion of it than be compelled to drag out my manure after the frost is out of the ground.

Mr. Throp.—This tile we are talking about is about four feet down in the ground. If there is any fertility in the water that floats on the soil, it is going to be filtered out before it reaches the tile, and be kept in the soil. I have been watching some people in my neighborhood who have been putting in quite a number of thousand feet of tile. Two or three years ago, in fact, one young man put in 20,000 feet at one time, in one season. He hired a lot of men and they came and tile-drained diagonally across eighty acres, which was almost a worthless piece of ground before he began. That slough ran down for miles, and the water came coursing down through there in the spring on each side of the ditch. It was a boggy marsh. Part of it he could mow and part of it he couldn't. He put in 20,000 feet of tile, and the result is that he plows the whole thing now, and those eighty acres are the most valuable he has on his farm. I asked him if he thought he would do any more, and he tells me as soon as he can he is going to tile all his land that needs it. Another man I know, lives along Horicon marsh. The marsh extends in the shape of sloughs around up through his farm. He commenced tiling there, and I guess he will never get done. He manages to get good crops where he does tile; so much better crops than he used to get that he buys his tile by the carload, and his neighbors are following suit and putting in carloads of tile in the same kind of places. So it seems to me that there must be something in it, if we are unfortunate enough to have that kind of land. I am very glad I haven't that kind of land, myself.

There is one point that the gentleman did not touch on, and that is in regard to the water flowing on to the other man's land. You had better get his consent. This last man I spoke of putting in so much tile was troubled with the water in the spring flowing over from his neighbor's land and down through his. He wanted him to go in with him and put in a 10-inch tile through there for his own benefit. He put a dam across and held the water back on to his neighbor's land, so it couldn't overflow his land, and all the water had to go down through that 10-inch tile, and if there was any surface water he held it back.

Mr. Arnold.—The great German chemist, Liebig, demonstrated, fifty years ago, that if you take liquid manure and run it through the earth covering tiles, that you will have pure water when it goes through. I would not be afraid to tile drain land on account of the loss of fertility, but I think you would lose less if you had a crop growing than without it, according to these experiments.

Good Roads.

By Dr. H. D. Hunt, Marathon, N. Y.

When I was requested to present for your consideration and discussion at this meeting the subject of "good roads," I was very much pleased; not because I felt that I was master of the subject; not because I felt I could tell you all about road building—that is, the material to be used, the manner of using and the cost thereof—but because I considered it an evidence that the farmers of this section were aroused to their importance. I am simply the "old country doctor," and as such have plenty of opportunities to examine the roads, form opinions, and sometimes express them, and I fear they are not always complimentary to the roads, to the road officials, or to the communities through which the roads pass.

How can our highways be improved?

What system of highway improvement should be adopted?

How can the desired end be accomplished?

What will be the cost?

How much will be added to our already heavy burden of taxation?

Will the supervision be a heavy expense?

Will some official receive good pay and have an easy job while we toil and sweat to pay the tax from which he draws his salary?

Can any system be adopted that will give us better roads without increasing taxation beyond our resources?—These and hundreds of other questions at once flash through the mind of the farmer as soon as he contemplates the possibility of having better roads over which to haul his farm products; and the answers that come up in his mind in reply are frequently not such as he most earnestly wishes.

Many years ago I think the farmers used the roads fully as much, in proportion to the population, as they do to-day; I refer to the time when the farmers had to haul their farm products a long way to market. I have frequently heard farmers relate experiences in hauling loads of farm produce from Cortland county to the city of Albany. In those days the roads were full of teams at certain seasons of year, and the roadside inns were taxed to their utmost to accommodate the traveling public. But circumstances wrought a change. By the opening of the canals the markets were brought nearer to the farms, and road travel was much diminished, and circumstances still continued to work to lessen highway travel, and thereby diminish the importance of good roads. Railroads were built traversing the country east and west, north and south, until a market place was established in almost every town. Then at once this (Cortland county) became the great dairy section of the State, and the average farmer could stay at home and work through the entire season, and in the fall load his entire farm product on his wagon and draw it to market at a single load. His necessary use of the roads was very limited, and for a period they were used by him more for pleasure than from necessity. Circumstances continued to exert their influence until to-day a very large number of dairymen draw their products to market—not in one day and at one load, but to the milk station 365 days in a year, and most of the time twice a day. They are now using the roads for something beside pleasure. The farmer of this section has found that he can no longer afford to grow his own grain feed. Cheap transportation that has come hand in hand with the development of the great west has made it possible for him to buy western grain feed cheaper than he can produce it on his own farm, and he now draws many tons of feed from the feed store to his farm.

But a few years ago the markets were calling on the grain producers of New York for a portion of their product, now those markets are supplied by the great west. The western creameries are now supplying the market that but a few years ago many of the farmers of Cortland county helped to supply, and most of this has been brought about within the last decade. If such great changes have been brought about within that time, changes that have presented to the farmer great obstacles which he has been obliged to meet and surmount, is it not a rational thought that he will have equally great ones to meet in the near future? In view of all these facts, and reasoning from this standpoint, is it any wonder that the farmers are aroused to the necessity of more and better road improvement? But how is this to be accomplished? Certainly the farmers cannot do it all themselves. They cannot assume so heavy a burden of taxation. Then of whom shall they ask assistance? Have they not the moral right to call upon those to whom they have been donating for years? I mean the cities and villages. Who built the cities? Who maintains them? Who furnishes them their sustenance to-day? The farmer. What has contributed more than any other factor to make New York city the second largest city in the world? There can be but one answer, namely, the Erie canal. Whose money built it? Seventy-five years ago, when the canal was being built, New York city did not pay sixty per cent. of the tax; neither did the canal counties, with their great cities, including New York, pay nearly eighty per cent. of the State tax, as they do to-day. The farmers had to pay largely for the building of the canal, for the enlargement of 1862 and for the maintenance of the canal for many years. But a few years ago nearly one-third of the State tax paid by Cortland county was for canal expenditures, and the advantage that it has been to the canal terminal counties is beyond all mathematical calculation. But what profit has the farmer received? Your profit, if any, has come by such a round-about way, and from so remote a point, that its calculation is scarcely possible and would be more nearly represented by a cipher than any figure. Look at the public buildings that have been built in the cities all over the State at the expense of the taxpayer, either in State or county tax. Are they not a great benefit to the municipalities wherein they are located? Most certainly.

Now I would not have you think that I call your attention to these facts to condemn the canal system of our State, neither would I have you think that I would advocate the erection of our public buildings upon the summit of some barren hill top away from the centers of population, but simply to illustrate the fact that in soliciting help from cities and villages to rebuild and improve country roads, we are but asking for the return of our own. We are not begging, for farmers, above all classes, dislike to beg or be accused of begging.

We have a law called the "Higby-Armstrong Good Roads Law" which provides the the State shall pay one-half the cost of building permanent roads constructed under State supervision. Also the "Fuller Good Roads Law." providing that any town may draw from the State treasury one-fourth as much money as it will levy and collect by direct tax for road improvement. These laws were passed by a Legislature made up, by a very large majority of representatives from cities and villages, which can receive no direct benefit from the operation of these laws. That alone is strong evidence that the cities sympathize with us in our effort to get good roads, and are willing to extend a helping hand. As a further evidence, you are of course, aware that the State Engineer and Surveyor during the last sessions of the boards of supervisors throughout the State, invited each board to send three delegates to a good-roads convention, held at Albany, February 8 and 9, 1900. I had the honor and pleasure of being one of the delegates from this county, and I was surprised to see that the delegates in that convention who lived in cities were the most enthusiastic for improvement of country roads, one gentleman even going so far as to favor the bonding of the State for the enormous sum of $12,000,000 for the improvement of country roads. When a resolution came up petitioning the Legislature for an appropriation of $1,000,000, for the carrying out of the provisions of the "Higby-Armstrong" Law there was not a dissenting voice. All this evidence shows that the cities will aid us if we but ask and give a guarantee that the money appropriated will be faithfully and profitably expended. By a guarantee I do not mean an indemnifying bond drawn in accordance with the provisions of some man-made law, but a guarantee in accordance with that higher law in which is written: "By their works ye shall know them." Then what work shall we do? What work can we do that will be better than that which we have been doing? Let us see.

We can do as they have done in other counties, organize county good-roads leagues. Through such organizations we can get all the literature on the subject. Each member would thus become familiar with the present laws and from time to time be posted on any proposed new legislation. We would be in touch with like organizations in other counties, thus putting us in communication with all portions of the state. Comparisons of conditions could then be made, which is very necessary, for a law that might be of great benefit to one portion of the State might be of little or no use to another. For instance, the "Higby-Armstrong Law" may be of great advantage in some counties. In a county which contains large cities that pay a large portion of the county tax, it seems clear the advantages would be much greater than they can possibly be to Cortland county. With all counties in communication through County Good Roads Leagues, the wants or wishes of one portion of the State would be known to the other and any proposed legislation might be so framed as to meet the needs of all.

Next let each town adopt the money system as provided by the "Fuller Law." I am happy to say that my own town has done that by a vote of nearly three to one in its favor; yet I do not believe that there are very many of the voters of my town that are fully satisfied with the provisions of the "Fuller Law"; but they seem to reason that it is the best within reach, and certainly a great improvement on the labor system. Under its provisions every man will pay a road tax in proportion to his assessment, and not pay it by sitting under a shade tree by the road side, while his neighbor is shoveling gravel in the sunshine; neighborhood quarrels over highway work will be a thing of the past, and I think all believe that one dollar in money will purchase labor that will do the roads double the amount of good that one day's work accredited for road work under the labor system has done in the past, and, besides, we have the 25 per cent. from the State in addition. In the convention at Albany, to which I referred, about 80 towns were reported as having adopted the money system and everyone, without exception, found it a great improvement over the labor system.

I believe under the labor tax system the rule is, as generally adopted, to assess one days labor for each $500 assessment, which at commutation rates $2 on a thousand dollars assessment, in round numbers $20,000 in the county of Cortland, dropping the assessment of incorporated villages, would give us $5,000 from the State. Would not, think you, $25,000 a year faithfully and properly expended on the roads of Cortland county make a vast improvement on our roads in a few years? Let us bring the figures down to the town of Marathon. You have an assessment of about $725,000; under the labor system your tax will be 1,450 days, or $1,450, and your poll tax added, would raise the amount of tax to $1,600. Then you would draw from the State $400, thus giving you $2,000, with which to buy highway labor. Does anyone in the county believe that there has been even $1,000 worth of work faithfully and properly performed upon our highways in a year during the last 20 years? If so, you have the banner town of the county, for if you have faithfully and properly expended $20,000 upon your roads in labor within the last 20 years, you have, I will guarantee the best roads of any town in the State that is still on the labor tax system. Further, I assume, that the competent road commissioner would not, as many pathmasters have done, order the sods, stones and muck scraped on to the roadbed, making it many times worse than it was before, in which condition they allow it to remain until rain washes the muck back into the ditches and then order the sods and stones thrown back upon the muck again. In the fall a stranger could not tell whether there had been any work done on the road that year or not.

If we would organize County Good Roads Leagues and adopt the money system of highway tax, would not the cities accept that as a sufficient guarantee that we were in earnest in the matter of road improvement? Would they not be satisfied that we mean to use every dollar that comes to our hands in the best possible manner?

We can learn something from our sister states engaged in road building. Massachusetts whose area is about one-sixth that of this State, has built within the last seven years 300 miles of macadam roads at a cost of $3,000,000 or $10,000 per mile. New Jersey in the same time built 440 miles at a cost of $2,200,000 or $5,000 per mile. Thus in these two states, with an area of less than one-third that of New York, there has been expended on roads by State aid $5,200,000, and they have for their outlay 740 miles of permanent roads. What has been done in this State for road improvement during that same period?

In 1893, Governor Flower in his message to the legislature said that from correspondence with the town clerks of the State he had been able to compile statistics showing that there was being expended annually in this State under our system of highway improvement the sum of $3,000,000; that same ratio for the last seven years amounts to the enormous sum of $21,000,000 which has been expended in this State for the improvement of our country roads, and what have we got to show for it? Practically nothing. It is difficult to understand what such a vast sum represents. Think of it, enough to buy Cortland county and have money enough left to buy grain seed with which to sow it this spring and pay your hired help until you could sell your farm product in the fall; almost as much as that hugh stone pile, the State capital, cost, which many thought was a needless expenditure, but for which we have the finest capital building in the United States. But for our $21,000,000 expended for highway purposes we have not even a pile of stone, unless it be in the middle of the road, where we have to drive over it. Little wonder that the farmers are beginning to cry out for some better system of highway improvement! Our wagon roads are the great highways of commerce; over them are carried many more tons of farm produce than over all other freight carriers combined; over them all raw products first must move. The Department of Agriculture at Washington, basing estimates on the best data obtainable, fixes the cost of hauling over country roads, in round numbers at $1,000,000,000, or more than one-third the market value of the entire agricultural product of the country, and by careful comparison with the cost of hauling loads over the good roads of European countries, it is found that two-thirds of this enormous expense is chargeable to the bad condition of roads.

The fact that the national Government has established a department of road inquiry at Washington, is an evidence that national aid is not far distant. The Post Office Department at Washington, has for some time, been discussing the advisability of establishing postal savings banks, and the investment of deposits that would accumulate in such institutions has been a troublesome question in the department. Inasmuch as all safe investments are eagerly sought by rich corporations and the wealthy men of our country, they need all and more chances for safe investments than the present conditions of the financial world present. Therefore before the proposition for the establishment of postal savings banks can take form, some new scheme for investments must be founded and created. The proposition to loan such funds as would accumulate in such institutions to counties for road purposes at a very low rate of interest, say two per cent., is not a visionary one of my own, but is being discussed by eminent, careful and thinking men, and may eventually be formulated into some plan the advantages and benefits of which are clearly beyond our powers of imagination.

Advancement and improvement in all civilized and enlightened countries travel on the car of time. Mark the changes in local travel and transportation. But a few years ago the cities were content with putting down pavements, thereby giving better facilities for travel and transportation for the benefits of trade. Then very soon the horse street car was brought into use to facilitate travel in the busy centers, but soon that became too slow and electricity was harnessed to the car that business facilities might keep pace with the progress of time; and now New York city is going to expend $35,000,000 in building an underground rapid transit railroad, and, strange as it may seem, doing that without calling upon the taxpayer for a single penny. The Canal Commission appointed by the Governor of the State recently, recommended the improvement of our canals, the cost of which is estimated at $60,000,000.

Where are our country roads during all this period of progress? Just where our grandfathers left them and practically in the same condition.

The "Higby-Armstrong Law," provides for the construction of permanent roads under State supervision, that is macadam roads that will wear a long time with but little expense for repairs. This law provides that the State shall pay 50 per cent., the county 35 per cent., and the town or the petitioners 15 per cent., of the cost of construction. There is now a bill before the Legislature, if it has not already passed, and if it has not, it, in all probability will pass, appropriating $1,000,000 for road purposes under this law; that means that there shall be a like amount raised by direct tax in the localities where the roads are built, thus creating a fund of $2,000,000 to be expended in road building.* There has been built under this law twelve and one-fifth miles of road at a cost of $6,717 per mile. Cortland county has in round numbers 1,000 miles of road, one-half of which are important roads. Therefore, if it were possible for us to have the whole of the appropriation expended in this county, we would get about half our important roads macadamized, or if continued, we could have them completed in about two years, and we will have paid a tax of about 15 per cent., of our assessed valuation. Then the question at once presents itself. Will the value of our prosperity be thereby advanced sufficiently to warrant such taxation? That may perhaps be a debatable question. I most earnestly urge each taxpayer to examine carefully and critically the "Fuller Law," if he has not already done so, and while some defects may be found, it seems to me that it certainly has many advantages over the labor system. If it were generally adopted, it would be an evidence to the cities, to the Legislature, to the Governor, and the State in general, that we are in earnest in our efforts for more and better highway improvement. This would give us more and better legislation in the future.

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* Only $150,000 was appropriated for this purpose last year (1900).

There are many other thoughts that present themselves, when this matter is taken up for discussion. Permit me to call your attention to the employment of convict labor in road building. Some counties have already been experimenting in that direction, with what results I am uninformed. Of course they are counties that have more convict labor than we have in this county, yet it costs us about $1,000 a year to board our convicts. A portion of them are kept in our county jail in idleness, another portion in the Onondaga penitentiary, and the penitentiary get the benefit of their labor while we pay their board. Most of these convicts are able to earn their board, and many of them much more than their board. Once the problem is worked out, how to utilize this waste labor, and make the convicts earn their own board instead of requiring the taxpayers to do it, it may result in some benefits to our highways.

Bovine Tuberculosis.

CONDITIONS MISTAKEN FOR THE DISEASE.

By Dr. William J. Murphy, New York City.

The subject of bovine tuberculosis has received a great deal of attention from physicians and veterinarians alike for many years, and of the many animal ills it is probably the one most frequently discussed, yet the least understood. Because of the prevalence of tuberculosis in meat-producing animals and the possibility of transmission from animal to man, the disease should be most carefully studied and investigated. Proper precautions should be exercised to prevent its spread, and various sanitary measures adopted which should aim to free the bovine tribe from the terrible scourge with which it has so long been afflicted.

No doubt the cow and her diseases are closely allied to many human ills, and facts tend to prove that the disease tuberculosis in man and animals is identical. In the human subject the disease is not at all times readily diagnosed, and frequently other conditions with apparently similar manifestations are mistaken for it. The same is true with the disease and its diagnosis in animals. At times its existence in the live animal is very questionable, and conclusions hastily drawn often lack verification upon a subsequent post-mortem examination. I have seen it generalized in the young steer, where its presence was never suspected and was seemingly in perfect health. I have seen it in the blooded bull, where the tubercular matter had permeated every tissue and organ of the body, yet by no manifestation was the disease revealed until the animal was butchered for food.

Thus it is evident that tuberculosis can exist without its presence being known. On the other hand, I have seen very many small, emaciated, worn out cows, weak, decrepid, ill-fed, with a painful, hacking cough, hardly able to walk, pictures of bovine misery and distress, seeming typical cases of tuberculosis for all appearances, prove upon slaughtering to be entirely free from disease, the lungs sound, the lymphatic langular system normal, or possibly unlooked-for conditions met which would account for the animal's decrepid state. If these had been but occasional instances, I would have thought that perhaps a greater experience and a closer observation would disprove views superficially apparent; but such has not been the case.

Tuberculosis in the cow is not a malady readily manifest like pleuro-pneumonia. It lacks the prominent lesions of actinomycosis. It is void the acute symptomatology of splenic apoplexy or anthrax. The signs which denote the presence of an acute disorder are absent. It does not run a rapid course through various stages, but is a disease slow in character, with symptoms irregular and often ill-defined. Sometimes the presence of all the symptoms in prominent forms seems to make the diagnosis simple, yet a post-mortem examination reveals no trace of the disease. Tuberculosis is not responsible for the decrepid state of every cow. Other causes—not always diseases—are often responsible for the cow's decline. Naturally appears the question, what conditions and what diseases are mistaken for those of tuberculosis? There are a number of them. Some are of frequent occurrence, others are met occasionally. Some present lesions resembling those of the disease with which they are confounded, and some present very little similarity when carefully considered. Foreign bodies taken in with the food are responsible for a great deal of bovine distress—far more than one might imagine—and are a very prominent cause of lesions often mistaken for those of tuberculosis while the animal is alive. We have similar emaciation, a hacking cough, generally unthriftiness. Many of the obscure diseases of the cow, her frequent indispositions, her occasional cough, her loss of appetite and her different annoying and perplexing actions, arise from the presence of foreign bodies in the stomach and the distress which their presence sometimes occasion. In the stomach of the cow can almost always be found nails, pieces of barb wire and various extraneous objects. I should say that at least seventy-five per cent. of the cows used upon the farm or in the dairy are so affected. Some experience no ill effects from their presence, while others are sickened and emaciated by the inflammatory action which the irritating substance causes as it becomes lodged in the coats of the stomach or works its way through that organ into other tissues.

One time I selected a thin, worn-out cow, presenting all the external manifestations of tuberculosis as a case illustrative of the ravages of this disease. Upon a post-mortem examination, the lungs were sound and perfect, but a large table fork protruding through the coats of the stomach and surrounded by a large field of inflammatory exudates, readily accounted for the animal's wasted appearance.

Catarrhal pneumonia in cattle often leaves lesions in the lungs which have been mistaken for and accepted as evidence of the existence of tuberculosis, although the two conditions are entirely different. Where the disease has been of a severe type, we may find a portion of the lung destroyed and in its place, an abscess of varying size, encapsulated and presenting a varied degree of consistency, according to its age. Beyond its mere presence, it exerts no ill effect upon the animal and remains at all times different from the deposits of the disease with which it is confounded. The deposits of actinomycosis in the lungs of cows can not be distinguished from the deposits of tuberculosis by the unaided eye.

Throughout the West, a large number of emaciated steers are bought and shipped to distilleries in Pennsylvania and other States to be fed, or, more properly speaking, stuffed with the refuse from these concerns. Within a month they undergo a wonderful transformation. They rapidly take on flesh and are then shipped to abattoirs throughout the country. While they may appear to good advantage, they in no way equal the corn or grain fed animal, as an article of food. In the short space of one month, this distillery food has greatly impaired the animal's sight and many of them are totally blind. If they remained long enough, they would all be similarly affected. The lymphatic glands at the base of the tongue are enlarged from twice to four times their natural size and are generally the seat of an abscess, which, from its size alone, must materially interfere with the animal's deglutition. No doubt the glandular system throughout the system has been similarly affected. If these animals were kept long enough under such conditions and forced to partake of this food for a sufficient time, say, three or four months, I have no doubt that the lungs, the liver, the various internal organs, would become affected in the same way as the hide, the eyes, and the glands at the base of the tongue; while a condition due entirely to the nature of the food which the animal received, would, in all probability, be mistaken for lesions of tuberculosis.

Evident is it that bovine tuberculosis is a disease that is frequently confounded with ills and conditions, of perhaps apparently similar manifestations, but to suffer the condemnation of such animals as victims of plagues, with which they do not suffer, is an injustice to the farmer, a wrong to the stock-raiser, the propagation of a groundless fear to the mother, an imposition upon the public, an unfortunate blight upon our herds and an opportunity for foreign nations, who are jealous of our progress and our commercial activity, to discriminate unjustly against American cattle, American dairy interests, our cows, our meats, and the various food products prepared from our meats.

There is a disease tuberculosis. It frequently exists in cows. Sometimes it is local, and often it is generalized in form and is a malady that should be carefully watched to prevent its ravages extending beyond the limits of an animal plague and exerting its deteriorating influence upon the health of the human family. It is an unfortunate fact that nearly all the measures employed to eradicate tuberculosis, neither aim to exterminate it when it exists nor prevent its appearance when it does not exist. It is not surprising that with an ill so deceiving, with a malady so frequently the topic of conversation, various devices should be employed to assist in the determination of its presence in a suspected animal. We live in an age where wonderful "discoveries" from the fertile brains of "scientific explorers" are thrust upon us in rapid succession only to be accepted for a time, heralded as marvelous truths, tried, doubted, cast aside and abandoned. In my short life I have passed through an era of vaccine, mallein, antitoxin, pleuro-pneumonia, tuberculin, and we see them all travel the one path from spontaneous adoration through a varied career to a well deserved obscurity. They are generally born a proprietary article or the result of a secret process of preparation. They bloom for a while and then fade away, and with them go their victims, their advocates and the condemnation of a fickle world.

A FEW WORDS ABOUT TUBERCULIN.

Its use has attracted considerable attention. At first it was offered as a valuable remedial agent for the cure of tuberculosis, but being unable to sustain that reputation, it has since posed as a means of ascertaining the existence of tuberculosis in an animal when nothing else suggests the possibility of its presence.

Perhaps I am not in a position to criticise the action of tuberculin, or to comment upon its efficacy as a diagnostic agent. I admit that I have had no practical experience with its use. I never injected it into an animal to verify a suspicion of tuberculosis, principally because I reside in a large city and as yet the opportunity has not presented itself for me so to do. Neither do I wish to prejudice anyone against its use. Sometime ago the use of mallein was strongly recommended as a useful aid in the diagnosis of glanders in horses. I tried it in a number of instances and the results were entirely disappointing. In several pronounced cases of glanders with apparent manifestations, the test gave no reaction, and so far as I am concerned, its employment is not only unavailing but useless and dangerous.

Let us return to the subject of tuberculin. From time to time there have been brought to an abattoir within my jurisdiction, a number of cows which have been subjected to the tuberculin test and according to its provings, were affected with tuberculosis. In all the number that were slaughtered at different times, I have seen but few cases of generalized tuberculosis among them. and I am inclined to think that possibly they were obtained more by accident than by operation of the test. From what I could learn, the ones most affected gave the slightest reactions under the test. Many of the cows in which what might have been tuberculosis, but probably was not, was discovered only after the most diligent search. They were in the form of isolated, minute pin-head deposits in various glands and in the structure of the liver and were accepted as responsible for the provings of the test. One thing is certain: If what is often accepted as evidence of tuberculosis by the tuberculin operator is really tuberculosis, then the entire bovine tribe, both young and old, are hopelessly afflicted with this disease—hardly a reasonable supposition. Among them were cows in which the most diligent and careful scrutiny failed to discover the least sign of disease, and I learned that in one of these animals, the rise in temperature had been most pronounced.

While my observation in regard to the efficacy of tuberculin has been entirely negative. I do not doubt that it has many advocates and many of them have advised me that I have been unfortunate in witnessing the work of careless or incompetent operators—hardly an acceptable explanation. To me the object of tuberculin has been a most interesting study, and a study of those who advise its use, has often been a more interesting study. One of the most remarkable truths connected with the subject seems to be the fact that a negative reaction with the test is not demonstrative of a freedom from tuberculosis. An animal may be a victim of generalized tuberculosis and yet the test not reveal its presence, a tuberculin idiosyncrasy. Time alone will decide the fate of tuberculin. It has banished into obscurity many popular delusions which have from time to time become associated with the medical creed, and I fear that when posterity reads the history of medicine, it will find that in a certain age, there flourished an idea quaint, queer, but unstable, that certain diseases of animals could be diagnosed by certain animal poisons being injected into their delicate composition, but with the advance of the light of truth, this idea, fantastic and amusing, fell by the wayside and was lost sight of in the onward march of the science of medicine.

No one wishes to partake of meat from animals diseased or sick. The health of the nation is at stake, and in no way can the disease-breeding material gain an easier entrance into the system, than with the food. But every cow is not afflicted with tuberculosis. While it is a frequent bovine ill, it is not a necessary complement to their composition. Of all the domestic animals, the cow is probably the least understood. Veterinarians do not devote to her the attention that her importance demands. The animal most vitally interested with human existence is left to the care of those who understand almost nothing of her ways or wants. She is kept in filth, is fed with filth, and her very surroundings breed the disease we try in vain to cure.

How will we eradicate tuberculosis? It is a subject that interests not only the veterinarian, but the physician, the farmer—the universe. We will answer the question by saying how the disease will not be exterminated. It will not disappear as long as the dirty, filthy cow shed remains. It can be bred into animals by the manner of their surroundings. The cow requires good air, light and ventilation, in place of the dark, stuffy pest holes, where she is usually confined. She must have competent attendants, instead of the brutal, worthless, repulsive degenerates, usually entrusted with her care. She must receive good, wholesome food, in place of refuse. She must be cleaned, exercised and manipulated with the care and delicacy that her complex mechanism demands and should receive. When the cow is properly kept, tuberculosis will disappear. When we thoroughly understand her ways and necessities, instead of injecting into her system products of disease—a notion whimsical, irrational and dangerous—we will have learned that this disease is an ill for which man's ignorance and mismanagement is largely responsible. By the proper observation of ordinary sanitary measures, this disease can be largely overcome, if not entirely eradicated. A subject fraught with such dangerous possibilities, requires the employment of measures not only heroic, but persistent and effective, if we wish to avoid a possible eradication of the bovine tribe and destroy a potent factor which might operate disastrously in the ultimate degeneration of the human race.

Bovine Tuberculosis in Its Relation to Man.*

By Edward Moore, M. R. C. V. S., Albany, N. Y.

This subject is a story old—older than many of the hills and valleys that beautify the landscape to-day, older than some of the islands of the sea. I speak of its antiquity because in this country bovine tuberculosis was rarely recognized until 1890. The disease in cattle has been described in veterinary works, printed mainly abroad, under such headings as tubercle, consumption, wasting, pining, and scrofula; also called angle berry and grape disease by butchers, because of the knotty growths found by them in affected carcasses, and it has been known to veterinarians abroad for a great many years; yet our stock papers, agricultural journals, veterinarians, and the American public generally gave the subject no importance prior to the year above mentioned. I searched the volumes of the *Country Gentleman* for ten years prior to 1890, and, outside of articles by the author of this paper, the subject was not mentioned until December 19, 1889, when it was stated that "cattle tuberculosis seems to be spreading on the continent of Europe, according to the statistics produced before the Veterinary Congress lately held in Paris. Of cattle slaughtered in public abattoirs, more than one per cent. were found affected with the disease." One might search back to the landing of the Pilgrims in vain for information on this subject prior to 1888. At a meeting of the New York Farmers at the Metropolitan Club, February 18, 1896, Mr. Theodore A. Havemeyer said: "I have been for a long time a breeder of cattle, as was my father before me. Up to 1888 I think tuberculosis

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was not known by my father; up to that time it certainly was not known by me." The organization he was speaking to is composed of about eighty of the wealthiest and most representative men in this country, who own high-class stock farms. Every member had large sums in pure-bred cattle, and was vitally interested in all such subjects, and, although many of them had had tuberculosis in their herds for years, they did not know it. The medical profession up to this time was in no way exercised over the danger of the communicability of tuberculosis from the bovine to the human race, nor, indeed, did they lay much stress on the infectiveness of the disease from person to person. Then suddenly all America was stirred by articles from veterinarians, physicians and laymen. Later, laws were enacted, cattle commissions appointed, inspectors were sent out, herds were subjected to the tuberculin test, and animals that gave satisfactory reactions were killed. Many physicians went to see post-mortems, were convinced of immeasurable dangers, and fell into line. Stock owners trembled and the public was in a panic, and saw more danger in milk than in rum. The tidal wave swept over the country; State and local boards of health, medical and veterinary medical societies, agricultural societies, farmers, grangers, dairymen, milkmen's associations, and the nail-keg and soapbox aristocracy of the country store were all discussing the "new" disease in cattle and its relations to man. The disease, however, was not "new," in fact, is one of the oldest, but it was new to most of the people and it served as a great scare. It was treated as if it were a most desperate scourge just imported into the country, when, as a matter of fact, it was no more prevalent in proportion to the number of cattle than it had been.

Legislative Appropriations for Stamping Out.—The chief aim of health boards heretofore has been to destroy tuberculous cattle; the greater the number condemned and slaughtered, the greater the glory. No matter that it struck consternation into the ranks of the proprietors of a great industry. No matter that in many cases the richest blood of heredity in pure-bred herds was forever lost—lost though it had cost lifetimes and fortunes to obtain;

lost through the wanton, needless, insatiable thirst for a big killing bee. What did it matter that a great paying institution employing many hands was wiped out; that the proprietors were financially ruined; that employees were thrown out of work; that great farms were deserted? Slaughter was the war cry. Salvation they dreamed not of. If it were proved that our people contracted the disease from the cattle, I would heartily favor such slaughter. Or from the cattle owner's standpoint I would favor it if assured that the undertaking were practical, and that its cost would be too exorbitant, and that the infection could then be kept out of the State. The framers of the laws under which the inspections have been made and the members of the State boards of health seem to have given no thought to the immensity of the task, or the expenditure such a plan entails. If they have, we have not been told how they propose to succeed. The yearbook of the Department of Agriculture for 1897, states that the government has made and distributed to State authorities sufficient tuberculin to test 57,000 cattle. The census of 1890 gave New York State alone 2,131,392 cattle. How much tuberculin would be needed then to examine the cattle in all the states? The United States government reports for 1897 placed the number of milch cows at 18,113,000; other cattle, 32,647,000. Total valuation, $877,169,414. If we could wave over this State a fairy wand and thus instantly banish all bovine tuberculosis, how long would the immunity last, while the remainder of this vast country is full of infection, and the bacilli can retain their vitality for months in a bale of hay, and the winds can blow them over the borders? I know of a stock farm where $100,000 was spent for farms and buildings, and $30,000 for bure-bred cattle, and in about a year these cattle were disposed of at any price, on account of the methods pursued by the State in which the farm is located. Tuberculosis in man, and such of the lower animals as are susceptible to it, is generally recognized as a specific infectious disease due to the tubercle bacillus, and this bacillus in either species is considered as practically the same. We are interested in this paper with tuberculosis in the human and bovine species, the two great families in both of which it exists to an alarming extent. The disease occurs in a limited way in several of the domestic animals other than the ox, but assumes very little practical importance so far as they are concerned. The disease is a slow and insidious one, wholly different in this respect from such diseases as cholera and small-pox of the human, or cattle plague of the bovine. Tuberculosis in cattle does not necessarily kill; on the contrary, many animals maintain ordinary health and high condition, apparently suffer no inconvenience from it, and finally die of some other cause. In other instances there are signs of constitutional disorder with more or less of the symptoms common to it, and in acute cases followed by death within a few weeks or months.

Breed.—All breeds are susceptible. It has been erroneously believed that Jersey cattle were most prone to tuberculosis, but the royally bred and the common scrub are alike subject to it, just as the various races of men are.

Sanitation and Spontaneity.—The old writers gave as some of the causes of tuberculosis, bad ventilation, filth and insanitary conditions generally. No combination of ill conditions can produce a single case of the disease, nor can the most perfect and elegant buildings and hygienic surroundings offer immunity from it. Of course this is easily accounted for now that the means of infections are understood.

Heredity.—Dobson, quite an authority a few years ago, in his work on the ox, says: "There seems to be no doubt as to the hereditary character of this affection, so that in no case should a bull be chosen from stock which are thus diseased. . . . A report to the parliament of Victoria, New South Wales, in 1886, says that heredity certainly plays a most important part in the propagation of the disease." This is the opinion of about all veterinary writers. Since the discovery of the tubercle bacillus and the application of the tuberculin test, it has been found that calves from tuberculous dams, if removed immediately after birth from all chances of infection, rarely show disease. Heredity has but small claim to attention now.

Predisposition.—We have been assured by all writers that predisposition and conformation were most important factors. We know to-day that no matter how narrow-chested and weak constitutionally an animal may be, tuberculosis cannot occur without infection, and it does not seem to select the puny ones especially.

Contagion.—We have seen that most of the old ideas about tuberculosis have been dissipated, but its infectiveness is beyond cavil. That it will spread among healthy cattle when they are kept with diseased ones is well known.

Tuberculin Test.—This has been stated by many to be an infallible guide in the diagnosis of bovine tuberculosis. I may say that it depends largely on the infallibility of the man who uses it. If a correct selection of animals is made, leaving out any that should not be tested, and the proper amounts of tuberculin are used for the varying ages and conditions, then if the temperatures are taken without errors we shall have tables that if correctly interpreted, are very valuable in determining the number of animals that are free from tuberculosis and the number that are not. But tuberculin is not an automatic machine; it requires brains, judgment and experience to make a test and then read the answers correctly. When used with these prerequisities, it is a highly efficient diagnostic agent.

Percentage of Diseased Cattle in Herds.—In some herds of cows of dairy age the percentage may run from twenty to ninety per cent., and now and then a herd may be found in which every animal is infected. In herds in which there is a goodly number of young animals the percentage is smaller. Young animals are comparatively free from it. Mature cows give the largest percentage of victims, those from a year and a half to three years old the next, and those less than a year old the least. There seems to be diversity of opinion among physicians as to whether tuberculosis is more common in adults or children. This point should be settled, and it should be demonstrated how and from what source infants obtain infection. It has been convenient up to this time to attribute thousands of cases to the ingestion of cow's milk. The *Veterinary Journal*, London, England, for June, 1889, gives an account of a meeting of the British Medical Association at Glasgow, and Dr. Carpenter stated that eighty per cent. of the cattle sent to the principal meat market in London were affected. Professor McCall said that twenty-five per cent. would be nearer the mark for Glasgow. In Saxony it is said to be about one per cent.; in Berlin, 3.2 per cent. New York State Tuberculosis Committee's Report for 1895 states that about seven per cent. is figured as the average for the whole State. The writer examined a herd in this State in which 27 out of 30 animals were tuberculous, and some were in the last stages of disease. Three youngsters were free from it. Another herd examined in Connecticut gave about 50 per cent. of diseased adults. Nearly half of the healthy ones were under two years old.

Transmission.—We have now arrived at the point upon which hinge very largely the health and welfare of humanity and the fate of millions of dollars' worth of cattle. Is bovine tuberculosis communicable to the human subject? This is the paramount question, and it must be intelligently answered. The physician, the biologist, and the veterinarian are called upon to solve this problem, and below are given opinions from each, as well as from the State Board of Health, using these merely as examples of the universal opinion on the subject. We have noticed that so far as heredity, breed, sanitation, spontaneity, and predisposition are concerned, there has been a vast amount of error taught. We will now consider transmissibility. J. H. Girdner, A. B., M. D., in an article published on the disease germs and how to avoid some of them, states that "the other principal source of human infection is from drinking the milk and eating the flesh of tuberculous cattle. Tuberculosis in children usually manifests itself in diseases of the bones and joints, white swelling, and in enlargement and suppuration of the glands of the neck.

In nearly all such cases the infection comes from drinking milk from tuberculous cows." Bulletin 118, New Jersey Experiment Station, on the suppression and prevention of tuberculosis of cattle and its relation to human consumption, by Julius Nelson, biologist, contains these words: "But it is principally for man's sake that the lower animals should be included in the general scheme for freeing the country from this evil." In the *Journal of Comparative Veterinary Medicine*, December, 1897, C. C. McLean, veterinary surgeon, and a milk inspector in Pennsylvania, contributes an article which was read before the State Veterinary Medical Society. The following is a part: "The houses of the wealthiest in the world and the homes of the poorest testify that our meat and milk supply cause thousands of deaths from this disease every day. Tuberculosis is therefore the most important disease for the veterinary profession to deal with." The report of the New York State Board of Health to the Legislature of 1895 contains the following: "There is a complete unanimity of opinion now in the scientific world as to the communicability from man to man, and from animal to man, and man to animals. That milk and its products will convey it has been proved repeatedly. This has now past beyond the experimental stage, and is no longer open to doubt. It has also been proved that lower animals fed with tuberculous meat become tuberculous as a result of such feeding." Such, then, is the common opinion to-day. Many of the statements are couched in language calculated to defy further investigation and to discourage even a doubt as to their correctness; however, we shall endeavor to show by the conditions as they exist between man and animals, and animals and man, that no stress of words, no amount of bigotry, no arbitrary proclamation unsupported, can hold the truth in bondage. If the State Board of Health believed its own teachings and was sincere, why did it inspect, tuberculin test, condemn, quarantine, and tag for slaughter various lots of cattle which, according to the board's reports, were inimical to the public health and were prone to spread disease among other cattle, and after holding them in quarantine a considerable time to pass a resolution and send out the following notice to the owners of said diseased cattle?

"You are herewith notified that the quarantine imposed upon your cattle by the inspectors of this Board, in pursuance of orders from this Board, and in conformity with the power granted by article 4 of chapter 661, Laws of 1893, is relieved and raised, and the tags and other devices used to mark said animals may be removed by you."

As well might our penitentiaries be thrown open and the murderers and convicts be told to go free, and that any striped clothing or other devices used to mark said criminals might be removed by them. The Syracuse (N. Y.) Board of Health has determined that hereafter all the herds whence the milk supply of the city is derived shall be kept under municipal supervision, and that all dairy animals shall be examined by a physician at least twice a year. A round aluminum tag is fastened to the ears of the healthy animals, and an oblong tag to those of the diseased ones. If physicians in State boards of health and in other positions are competent to handle animal diseases, then, to be consistent, we should have a corps of veterinary surgeons to guard the public health. Both are doctors. Could Miles do what Dewey did? Could Dewey win where Miles has won? Both are fighters. While I have the utmost respect for and confidence in the ability of the medical profession, I can but regret that its code of ethics allows its members to imperil its dignity by seeking positions and assuming rôles in which they are manifestly out of their proper sphere. To the honor of the profession be it said that its ablest members are not dissemblers, and that only its pygmies pose as veterinarians. But we have digressed from the subject of transmission. We have been told over and over again that "the slight difference between the bacillus of man and that of cattle is a temporary peculiarity, and is overcome when the conditions are favorable. . . . That all over the world tuberculosis in man and cattle coexists in the same locality; that among fish eaters and in countries having no cattle tuberculosis is practically unknown. That it prevails largely among beef eaters and cow-milk drinkers; that among our Indians, who eat diseased beef raw, 50 per cent. die of tuberculosis, while among the northern Indians, who never see beef, it is relatively unknown, goes to show that the conditions being favorable the infection passes readily from ox to man."

Professor Law used this argument in an article published last month: "I deny that it is shown that the infection passes readily. Coincidence is the only thing established. Conditions that favor the spread of this disease from human to human also contribute to its dissemination from bovine to bovine." Rivers and railways often run side by side for the reason that nature in such places favors both, and not because there is any relation between them, or that one is necessary to the other. Since we know the cause of tubercle, will any one have the temerity to assert that cattle must be in close proximity in order that infection may pass from man to man? Or, if there is a healthy herd of cattle on an island not inhabited by mankind, and we wish to spread tuberculosis among them, will it be argued that it is necessary to send a number of consumptive people there, as well as a few tuberculous cattle? If so, the answer is simple. The tubercle bacillus is not a parasite requiring an intermediary bearer. In the fish-eating frozen regions, where cattle are not kept, the bacillus meets obstacles fatal to it. If eating diseased meat raw is such a potent factor, why is it a fact that the carnivora rarely develop the disease? Again, beef is not so highly infecting. In many tuberculous animals the muscles or meat is not diseased. It is not necessary to speak of cooking as a safeguard at this time. This paper deals only with bacilli that are capable of infection, and not with those that have been destroyed, or are therefore harmless. Why hunt for a wild tribe who eat beef raw, when we have the better evidence of millions of our kind who drink milk and eat its products raw, and we do not find 50 per cent. of them dying annually from tuberculosis and all other diseases put together? And it has never been shown that human tuberculosis was the result of infection obtained from cattle, either by germs taken into the system by inhalation, or by the ingestion of the products of diseased animals. The cases reported and quoted by writers are not supported by evidence of such transmission, and as we proceed it becomes more apparent that evidence had to be manufactured, the natural output being wholly inadequate to the needs of the advocates of that theory. About 20 years ago I wrote articles on bovine tuberculosis for newspapers and live-stock journals, and called attention to the possibility of its transmission to the human. That the disease rapidly spread among cattle by infection was pointed out. The advice given then is equally applicable now—viz., that cattle owners should have their herds inspected; that the diseased ones should be isolated; those that are physically bad should be killed. Disinfection was advised for stables, etc. In 1885, after killing two thousand dollars' worth of cattle in another state with the owner's consent, there being no law to compel slaughter in any state at that time, I gave the *Albany Argus* a column article on Animal Diseases and their Relation to the Public Health, and on the subject of tuberculosis, said: "How much of the prevalence of human tuberculosis may be due to milk and beef from tuberculous cattle is a question yet to be determined, and is a serious one indeed." Therefore, the position I now take after having warned the public many years ago, and frequently since, to use all possible care to prevent the transmission of tuberculosis from cattle to man, is arrived at from a vast experience with the disease in cattle in England, Canada, and the Eastern and Middle States, and from a study of the people most exposed to any infection that might be possible from such animals.

Bacilli in Human and Bovine.—Charles Darwin says that man has given rise to many races, some of which are so different that they have often been ranked by naturalists as distinct species. The races differ in constitution, in acclimatization, and in liability to certain diseases. On these same principles micro-organisms are very much modified by the conditions surrounding them. Sternberg, in his *Manual of Bacteriology*, states that the tubercle bacillus is a strict parasite, and its biological characters are such that it could scarcely find natural conditions outside of the bodies of living animals favorable for its multiplication. It therefore does not grow as a saprophyte under ordinary circumstances. But it has been noted by Nocard and Roux that when it has been cultivated for a time in artificial media containing glycerin it may grow in a plain bouillon of veal or chicken, in which media it fails to develop when introduced directly from a culture originating from the body of an infected animal. The human is omnivorous, the bovine is herbivorous. The normal human pulse is about 72, that of the ox 40 to 45. The normal temperature of the human is 98.6° F., that of cattle from 100° to 100.5° F. Thus the normal temperature of the ox is equal to quite a fever in the human. I am of the opinion that there is something in the human body antagonistic to the favorable development of the tubercle bacillus of the bovine, and there is in the body of the bovine a check to the colonization of these animals by the bacilli from the human species. Hordes of Hottentots transferred to the polar regions would rapidly perish, yet the Eskimo thrives there. Sternberg says: "A certain species of bacilli may be pathogenic for one species and not for another. Thus the anthrax bacillus, which is fatal to cattle, sheep, rabbits, guinea-pigs, and mice, does not kill white rats. The bacillus of mouse septicaemia kills house mice, but field mice are fully immune from its pathogenic effects. On the other hand, the bacillus of glanders is fatal to field mice, but not to house mice." Here is a distinction as finely drawn as that which I have alleged as existing between man and the ox. I believe that the tubercle parasite of man has by its long existence in that host acquired, as it were, individual characteristics which unfit it for life in the ox, and that the "micro-organism" of tubercle, which for centuries has had its habitation in cattle, has become practically specific to that class of animals. I am therefore persuaded that if the environment be changed in either direction the pathogenic power will be lost. I have read of cases of accidental inoculation of the human from the bovine, and if they have occurred they must be very rare, inasmuch as none have come under the writer's observation, and probably no one has had greater experience with tuberculosis in cattle. I am positive that many supposed cases have been incorrectly interpreted. Suppose one member of a family on a farm develops tuberculosis, and there are one or twenty tuberculous cows on said farm, it does not prove that the individual obtained the infection from the bovine. It is quite probable that he has been exposed to infection from human tuberculosis hundreds of times. Many reported cases hang on just such vague evidence as this. If a man walks into a bank, and while there is found to have twenty dollars in his pockets, is it *prima facie* evidence that he has become infected with the germs of wealth of that institution? Or, is it not possible that he was suffering from monetary engorgement when he entered that hotbed of filthy lucre? It must be proved beyond peradventure that he was penniless when he entered the building if we are to blame the bank for the condition of his pockets. Just as positively must we know that infection passes to the human adult or child from cow's milk or its products, or from beef, or through ingestion in other ways, or by inhalation of bacilli from the bovine, and that they alone establish the disease, ere we can truthfully say there is such transmission. How may we know that a human being is tuberculous when no germs can be obtained from the subject, and no marked symptoms are observed? If an adult or child has tuberculosis, and it is proved that such patient has partaken of milk for any length of time from a cow known to be tuberculous, it is by no means certain that infection came from the cow unless there is proof that it did not come from the human, and that it did not exist prior to his ingestion of the milk. Let us take cognizance of the difficulty of establishing such a fact. Humanity wanders incessantly. The germs of human tuberculosis are wafted on the winds, are carried by the waters, may be brought home in food or clothing, may be inhaled at church, theatre, or hotel, in motor or parlor cars. They do not stand out in large black masses, like the rocks the mariner is ever alert to avoid, but without our ken, noiseless, imperceptible, and intangible they surround and invade us. They do not sting when they capture a victim; then how can we know the time, the place, and the source of infection? Even the milk from that tuberculous cow just mentioned may be further contaminated by bacilli from a human being before it reaches the consumer, and the bacilli from the human may establish disease, while the bacilli from the cow prove inert. Consumption in people is so common that physicians have unlimited facilities to study its aetiology. For instance, in New York State the deaths from this disease for eight years from 1888 to 1895 were 104,804, an average of 13,100 a year, and it averaged about eleven per cent. of all deaths. The annual report of our State Board of Health for 1896 says: "Tuberculosis in some form or other accounts for a very large percentage of the deaths in the State, and when it is known that there is at the present time a large amount of meat consumed from tuberculous cattle, and that milk from such cattle enters into the dietary of the people, and that there is danger when the bacillus is ingested, it is believed to be a most potent source of infection, especially in children." Note the expression, believed to be, and if we read from scores of writers on this subject, we shall find that when they come to this point they all hide behind just such terms. Where are their facts, and why do they not give us some positive statements, with convincing illustrations of the methods by which they proved to themselves that such was the case? Too long have writers worn the thinking caps of others, too confidently have they accepted the statements of supposed authorities. There has been too much heredity in ideas and quotations. Practically all the people of the State eat the products of cattle all their lives, and tuberculosis in cattle is well distributed throughout the State. Now, then, if the disease passes readily to man, even laymen should be able to note the fact where large numbers of cattle are infected. But they, and their physicians, and their veterinarians have merely presumed, imagined, believed, supposed, and concluded that such "might be the case." One thing is well known, viz., that 13,000 human consumptives give off enough infective material annually to account for all the human tuberculosis in the State without the aid of a single bovine.

Transmission from Human to Bovine.—It is of less interest to physicians whether tuberculosis is transmitted from the human to the bovine; still, if the disease is intercommunicable, as we are assured it is, then it is equally important either way. I have not been able to learn of a case where the disease was established in a cow or a herd from human sputum. Dr. Cooper Curtice says: "In 1897 I tested two hundred and forty cattle in the vicinity of Saranac Lake, New York. Every one there supposed that I would find tuberculosis in herds that fed in the fields where the consumptive patients that resort to this place take their exercise. Not one case was found." Not only this, but the herd of the sanitarium had been previously tested with like results. If tuberculosis could be transferred to cattle from human beings, it should certainly occur at such a place as Saranac Lake, a sanitarium where thousands of consumptives resort. Thus, while feeding experiments may have been interpreted as showing in some instances that infection from human to bovine were possible, it seems very well established that the infection from man to cattle does not obtain when consumptive people and healthy animals occupy positions toward each other daily, which are calculated to offer every opportunity for such transmission.

Dr. Theobald Smith is certainly working in the right direction; his article, A Comparative Study of Bovine Tubercle Bacilli and of Human Bacilli from Sputum, is based upon scientific investigation of a very high order, and his deductions go a long way toward the establishment of the principles promulgated in this paper. He says:

> "The absolute identity of tubercle bacilli infecting mammalia has been so generally assumed, and the assumption used as a basis for the enactment of sanitary measures having for their object the prevention of any transmission of tubercle bacilli from animal to man, that anyone who would attempt to question this identity must be prepared to meet considerable skepticism. Taking a broad biological position, we have every reason to examine into the assumed identity of the bovine and the human bacillus."

Exactly, and we shall facilitate this important work in proportion as we cease to be parrots in repeating what we have been told, and as we rise above mere assumption and scan closely every bit of evidence, giving credence to nothing that is not warranted by scientific investigation, indefatigably pursued to the end, that truth may be established. Dr. Smith has demonstrated that human bacilli grow more vigorously from the start than do those from the bovine; that the length of the human bacillus is about two to three times that of the bovine, in cultures; also other morphological and biological characters in which they differ. More convincing are the divergencies in their physiological effects, as shown by his experiments, in which there was more rapid death of all guinea pigs inoculated with bovine bacilli than those inoculated from human sputum. Experiments on rabbits confirmed those of the guinea pigs. His experiments on cattle by the inoculation of bovine tubercle bacilli and human bacilli in some ten cases shows "slight local lesions at the point where the syringe was inserted when human sputum bacilli were used, the disease not spreading. When the bovine bacilli were introduced there was disseminated tuberculosis of the lungs, tubercular deposits in lungs, ribs, pericardium and diaphragm, extensive tuberculosis of nearly all the lymph glands of the thorax, and slight tuberculosis of the spleen, liver and kidneys." These differences are so great that comment is unnecessary. Dr. Smith summarizes them in the following language: "The foregoing experiments, while they show unmistakably the close relationship existing among the various cultures studied, nevertheless justify us, if only to guide and stimulate further study in establishing a distinctively human, or sputum, and a bovine variety of the tubercle bacillus." These modern experiments are infinitely more reliable than those so often quoted of earlier investigators, because our knowledge is greater, our facilities are better. I will presently offer some practical evidence from the everyday lives of people who are constantly exposed to the infection from bovine tuberculosis. I know the cattle, know the percentage of diseased animals in the herds, and have been aware of the existence of disease in the herds for from several to eighteen years. I have visited the people, dined with them when there were plenty of bovine bacilli on the table to satisfy any ordinary craving, and I have noted the health of those families, especially that of the children, many of them having all their lives used the products of herds largely infected, and I have not yet discovered a single case of human consumption therefrom. It is axiomatic that if transmission is common, or even possible, the farms where large numbers of infected cattle are kept are the places where the fact can be best observed; because nowhere else in the world is there so much infective material, nowhere else are the bacilli so potent, nowhere else are people so exposed to the danger, if any exists, and at these places feeding and inhalation experiments so to speak, are constantly going on; and you will bear in mind that it is the mature cow that is oftenest affected, and it is from her that the largest amount of milk, butter, etc., are used. A vast amount of work has been done by scientists to demonstrate whether milk from tuberculous cows whose udders were not diseased contained bacilli, and it may be conceded that it does in some cases; they are also present in milk frequently when such milk is obtained from tuberculous udders. Sternberg, in his *Manual of Bacteriology*, says: "A more common mode of infection, especially in children, is probably by way of the intestinal glands from the ingestion of milk from tuberculous cows. That infection may occur by way of the intestine has been proved by experiments upon rabbits, which developed tuberculosis when fed upon tuberculous sputum." This is the sill in the doorway of investigation over which many a bright man has fallen. It is assumed that the infant will do exactly that which rabbits and guniea-pigs have done. All the evidence I have thus far collected indicates that it does nothing of the kind. Physicians as a rule are not familiar with the conditions surrounding a tuberculous herd, hence I have deemed it necessary to show you one in imagination that you may the better understand the facts.

Tuberculous Herd at Home.—Picture in your mind 200 cattle in elegant buildings of the immense size necessary to house such a family—electric light, proper ventilation, pure water, mountain air, drainage and plumbing up to date, strictest cleanliness, the best food stuffs given in balanced rations, pure-bred animals, everything first class and all under the keen observation of experts who note details and record them—yet somewhere in the past a number of tuberculous animals were bought and added to the herd. Those diseased animals looked all right, else they would not have been purchased at high prices. And after a few years we find that 25 to 50 per cent. of the herd is tuberculous. Remember that cattle stand in rows in many cases. The manger is a continuous trough. The partitions between animals are low and the cattle can reach each other on either side. They can cough up and blow sputum to a considerable distance, where it may fall on cattle to be licked off, or on food, or in water, or in feed troughs. The animals are turned out for exercise or pasture, drink at one trough lick themselves and each other, and drool upon litter or herbage that others eat. When confined in the stable during winter, think how the dried sputum is converted into dust and wafted about by the breath blown from the animals, by their getting up, lying down, shifting feet, switching tails, the opening and shutting of doors, the sweeping, the general stirring up at the time of foddering, and you will realize that there is a series of motions night and day always operating to favor dissemination of the disease by ingestion, inhalation, and direct contact with mucuous membranes. Suppose that we say of 200 animals 80 are tuberculous; in this number are some with disease so located as not to be harmful to others, but many are diseased in organs which allow free exit to the infectious material. The attendants breathe this germ-laden atmosphere, they handle the cattle, and no doubt often convey to their nostrils and mouths sputum from the cattle. They and their families, and the proprietors and their families drink the milk, eat the cream, butter and cheese, if the last is made, and in some cases, though not often, they eat the flesh of calves or older animals. Here, then, is the greatest abundance of infective material—inhalation of germs before breakfast; at breakfast they are spread over the oatmeal, poured into the coffee, on the fruit, spread on the bread, taken in the glass of milk. All day the air is rich with germs and they are served at every meal without extra charge, all furnished by the sanitary dairy company, unlimited, from the palace bovine home. Children often go into these barns, and are likewise exposed. What chances are there in cities for people to obtain infection from cattle, as compared to those just pictured in the country? Even the milk is most infective when freshly drawn from the cow, so far as bovine tuberculosis is concerned; the only way it can be more dangerous to people when served in cities and towns is through its contamination by bacilli from human consumptives. Yet your health laws all aim to protect the citizen; no one has ever suggested a law to protect farmers from infection by bovine tuberculosis. Again, the percentage of deaths from consumption is much higher in cities than in the country or in country towns. I recently wrote to some owners of herds where bovine tuberculosis has been long established and in which the percentage of diseased animals was high, and I quote the replies, omitting the addresses in some, but offer in evidence the original letters, which I trust you will inspect. In none of these places was milk sterilized, or any precaution taken to avoid infection. The butter that won the gold medal at the last Paris exposition was the product of a herd largely tuberculous. Thus we are again reminded that "All is not gold that glitters." A part of the scintillation may have been due to bacilli in this case.

The following extract is from a lady who has suffered extensive loss. Prior to the visit of the inspectors of the State Board of Health the farm and its herd of cattle were unequaled throughout the State.

April 4, 1899.

Dr. Edward Moore, *Albany, N. Y.:*

Dear Sir.—Your favor of March 6th received, and beg you will excuse my neglect in not replying sooner, but pressure of other matters crowded it out. In my opinion the actions of the State Board of Health were not only absolutely unnecessary, but absolutely criminal, and had I been in a position where I could, I fear I should have talked in Albany until some one was tired. My herd numbered nearly 200 head, young stock and all, and they butchered over 100 cows, leaving me with a herd of young stock on my hands. Some cows, after slaughter, could not be found to have even a pinhead size of a germ, even upon microscopic examination, while with the majority, *if* they could find a germ as large as a pea that might be called a tuberculous germ, the men in charge were happy. At the time the State seized the cattle the creamery was full of butter, which was quarantined and a sample of each package sent to Albany and tested. After all the stock was killed we received a clean bill of health upon the butter. There was absolutely no foreign germs or anything detrimental in it. But what of that? For the sake of giving a few cranks a job for a while, $30,000 worth of stock was killed. The blow killed my farm, and I have never been able to pull together since. I have never known a case of human tuberculosis to arise from the use of milk from my herd, either directly or indirectly. Our cattle had better care than thousands of children, and a regular veterinarian three times a week, and a consulting veterinarian twice a month always, and as often as needed at other times. I will send you under separate cover a souvenir of the farm as it was. Trusting you may be able to allay such useless slaughter,

I am very truly yours.

The above 100 diseased cattle appear to have utterly failed to transmit tuberculosis to the people surrounding them or using their products.

Hotel Bristol, Naples, Italy, *March* 24, 1899.

Dr. Edward Moore, *Albany, N. Y.:*

Dear Sir.—In reply to your favor of the 4th inst., I am always pleased to be of any service to you or any of my old friends.

In my 25 years' experience with cattle I have never known anyone who has had the care of cattle to have been infected with tuberculosis or consumption.

You are at liberty to use my name if you wish.

Very truly yours,

JOHN MAYER.

The above letter is from a son-in-law of Mr. Havemeyer, and these two gentlemen had one of the largest and best pure-bred herds of cattle in the world, and their herd suffered extensively from tuberculosis for years. Mr. Mayer has traveled across the ocean several times for the purpose of examining the best cattle abroad and purchasing the best animals he could obtain. He made special investigation as to the freedom of various breeds from tuberculosis, and imported a lot of Swiss and Simmenthal cattle because he believed they would resist the disease better than the animals then composing their herd.

MASSACHUSETTS AGRICULTURAL COLLEGE,
VETERINARY DEPARTMENT, AMHERST, MASS., *March* 7, 1899.

Dr. EDWARD MOORE, *Albany, N. Y.:*

Dear Sir.—Your inquiry to the director of the station regarding tuberculosis has been sent to me to answer.

In so far as I know, no one has ever contracted tuberculosis from contact with the animals in our old herd, or from the use of the milk or meat from the same. The records of our students and graduates only show a very small mortality from consumption. These records are not to be relied upon to prove that any student ever contracted the disease from the use of milk from the college herd, for they have not always had it for use. Some years the boarding club, which is run by the students and not by the college management, gets its milk from the farmers in town. I send you under separate cover a bulletin giving the history of our old herd.

Very truly yours,

JAMES B. PAIGE, D. V. S.

The following letter is from a very prominent firm in another State who have maintained one of the largest herds in this country for many years. I have known that there was a good deal of tuberculosis in the cattle for 16 years, and frequently in that time I have been at their farm and partaken of three meals a day for several days at a time. Two years ago the State veterinarian said that tuberculosis in cattle was a recent introduction into that State, yet the writer had killed many tuberculous cattle in said State before that man had graduated, or knew anything about the disease:

March 2, 1899.

My Dear Dr. Moore.—I am in receipt of your favor, contents of which I carefully note. In reply I am glad to be able to say that our herd of Jerseys is in fine condition and doing most excellent work. Never better. We, by which I mean all our several families, have used the milk always from the herd very freely, and in every appearance we are, each and all, as hearty and robust as aborigines. In fact, I think we could discount them. I mean, of course, in general health and condition, not in the use of the tomahawk and scalping knife. We have employees who have been with us for years and constantly with the stock and about the stables, and never have we had a case approaching even a semblance to tuberculosis among them. Some of our men, one of them constantly employed in the stables, who have young children, have always used the milk, and I have never heard of any ill effects therefrom. In fact, judging from their activity and lung power, I should say they were remarkably robust and energetic. By the way, I do not hear so much about cattle commissions in this locality as I did once upon a time. But I recognize, of course, the necessity of being watchful in every way; yet I believe there may be great and unnecessary loss in hasty and ill-advised action. I have used the term "milk" in this letter, and I mean by this term to include the entire dairy product, butter and cream.

Very truly yours.

NEW JERSEY AGRICULTURAL EXPERIMENT STATIONS,
NEW BRUNSWICK, N. J., *March* 2, 1899.

DR. EDWARD MOORE, *Albany, N. Y.:*

My Dear Sir.—Your letter of the 1st inst. received. I have to say that we have issued two bulletins on tuberculosis, but regret to say that the edition of one of them, No. 101, is exhausted. I, however, send you under separate cover Bulletin No. 118. In reference to your question as to whether I have any personal knowledge of a human being contracting tuberculosis from the bovine, I have to say that I have no personal knowledge of such a transmission of the disease.

Very truly yours,
EDWARD B. VOORHEES,
Director.

They had a herd largely infected with tubercle, and Professor Voorhees is one of the ablest writers on agricultural subjects connected with any of our State experiment stations.

Ellerslie Stock Farm, Rhinecliff, N. Y.

Dr. Edward Moore:

Dear Sir.—Replying to your letter to ex-Governor Morton, will say the fifteen cattle that were killed here in 1893 were from selections made entirely from herds in this country, and not from importations. They had been recently purchased and not bred on the place.

Since the last herd was made up there has been an occasional response on testing with tuberculin, and these animals have been invariably killed.

So far as I can find, there has never been any trouble arising from the use of our milk.

Respectfully,
CHARLES H. ROYCE,
Superintendent.

Dr. Edward Moore:

Dear Sir.—Replying to your inquiries in regard to the contagiousness of tuberculosis, would say that it must have been in my herd for six or seven years. Have never seen any bad effects upon any one who has used the products of the cattle or had the care of them. Very truly yours.

This gentleman has a family of five young children who have used the products of this herd all their lives, and ninety per cent. of the milk-producing animals were infected.

CHATHAM, N. Y., *March* 2, 1899.

DR. EDWARD MOORE:

Dear Sir.—None of the people who ate butter or milk from the cows that were affected with tuberculosis, which you killed, have ever been afflicted with consumption. Of course I do not know who used the butter I sold to the stores, but I do not recollect of but one case of consumption in Chatham during the time I owned those cows, or since then, and I do not think that person ate any of my butter. If I am able to furnish you any further information I will gladly do so.

Yours truly,

ALBERT E. TRACY.

About fifty per cent. of the herd were tuberculous.

FLORHAM FARMS, H. McK. TWOMBLY, PROPRIETOR.

MADISON, N. J., *April* 13, 1899.

DR. EDWARD MOORE, *Albany, New York:*

Dear Sir.—I cannot give you any evidence either *pro* or *con.* Looking back 20 years, the length of my experience with dairy cattle, I cannot recall a single person dying from consumption whose work was connected in any way with cattle or that consumed the milk.

Some four or five years ago, Dr. Austin Peters told me of a case where he hoped to establish a connection between two tuberculous cows and the death of one or two children that had used the milk. At that time the evidence was not conclusive, and I never heard whether continued investigation proved any thing.

I have often asked others, being greatly interested, whether such a connection had been established, but never received an affirmative reply.

Regretting that I cannot be of greater service to you, I am,

Very truly yours,

J. L. HOPE.

Superintendent.

Mr. Hope has had large experience with fine cattle, and was formerly superintendent for Hon. Levi P. Morton.

April 14, 1899.

DR. EDWARD MOORE, *Albany, New York:*

Dear Sir.—Replying to your inquiry, I would state that two years ago my herd was examined by the Connecticut authorities and 13 killed, this including everything that was suspicious. Prior to this the milk had been used freely by my farmer and his family, and one or more working on the place and their families, also in my own household, which, while in the country, includes daughter and her three young children. Since that time the same persons have used the milk, cream and butter, and, to the best of my belief, every one of them is in good health and looks as well as Mr. Crane's family, whom you know. I should say that, including Mr Crane's family, there must have been during the summer at least 10 adults and 8 or 10 children using the products, not including household servants. I do not know of a case of consumption or any indications of it in any of the persons referred to.

Very respectfully yours.

The above letter is from one of New York's prominent financiers, and his herd is one of the best in Connecticut, and, owing to the large percentage of diseased animals, and the number of children as well as adults who have been feeding on their products for a number of years, this evidence is exceptionally strong.

If we have succeeded in purging the bovine of responsibility for human tuberculosis we have severed the relation supposed to exist and which gave origin to the title of this paper. People everywhere will feel relieved. Cattle owners will vie with the cow-milk drinkers and the beef eaters in their appreciation of the fact, that their minds are now freed from the terrible menace that has heretofore haunted them. The cattle industry will receive new impetus. Physicians will have to educate consumptives to appreciate the necessary precautions they should take, nay, they must take, for the protection of their fellow beings, and healthy people must be made to understand in what ways tuberculous subjects are dangerous to them. The imperative need is for measures for the protection of human from human. Such education will cut down the death-rate more rapidly than medical treatment. The establishment of hospitals and retreats for the treatment and isolation of consumptives is the best step physicians have yet taken for the prevention of the spread of this disease. We are now raising one foot to step up on the firmer ground of the twentieth century, where no erring footsteps have yet been taken. In the few days left us ere we reach that new trysting-place, let us bend our energies to the great task of leaving forever behind us old prejudices; theories we were taught to accept, but which have not proved trusty; deductions arrived at from experiments well intended, but which are nullified by better evidence now before us. Let us not look at things as they have been pictured, but strive to see them exactly as they are. If we have failed to convince you, we have at least pointed the way for future investigation and given the earnest of the verdict that is to follow whether you render it to-day or to-morrow.

Household Economy.

By Mrs. Melvil Dewey, Albany, N. Y.

Records of the Pension Bureau at Washington show that there are five widows and seven daughters of soldiers of the American revolution now receiving pensions from the government. So near are we to the days when spinning, weaving, tailoring, dressmaking, shoemaking, brewing and many other industries were carried on in each individual family. To-day the great department store of our large cities may furnish almost every requirement of the home outside of cooked foods. Notwithstanding all the improvements which machinery and centralization of labor have brought, the conditions of our modern life grow more complex yearly. The waste in household methods, the duplication of work in many homes, the long hours of service, and the incompetence of help still confront us. The domestic problem touches every home, from the woman who does her own work to the fashionable society leader who entertains in some form almost daily. What practical steps can be taken to meet the present need? One busy woman with a large house where the latch string is always out has found her cares much simplified by dividing the regular work between two good helpers, and employing a laundress for two days each week, a seamstress or mender for one or more days as needed, a man for furnace, care of walks, piazzas, grounds, washing windows, dressing floors, cleaning brass, beating rugs, etc., and house cleaners as needed. The difficulty is of course in finding competent help.

In all our large cities there is a large class of women desiring employment who are unwilling to go out to service under present conditions. Could they have special training, live at home, and be employed by the hour, day or week, there are doubtless many who would take up housework could it be invested with somewhat of the professional dignity which surrounds the trained nurse.

We have long recognized that mistresses need special training almost as frequently as maids. A woman may be a genius in music, painting, literature or other arts and be quite unable to organize her own household on regular systematic lines. The executive faculty is perhaps as rare as other special gifts. If we had in our cities employment bureaus which represented every grade of skilled service from the washerwoman to the college graduate, who could go into a home and as an expert organize the daily work according to the individual needs of each family, the value of her special training, instead of being limited to one home, would be many times multiplied. In the library profession there is constant demand for just such expert advice, and graduates of our state library school are constantly called to local libraries to study the conditions and to advise as to the best forms of catalog, charging system, building, number of assistants, etc., required for that community.

The schools of domestic science have made a beginning towards providing skilled labor, but as yet the cost of the necessary plant, as for example in the School of Housekeeping in Boston, is so great compared to the small number who can receive training, that the plan would be prohibitive in most cities. It might be possible to organize such a school with a bureau which could supply skilled labor of all grades, by the hour, day or week, as well as for permanent service. Where young women come from the country or have no permanent homes, the plan often adopted by trained nurses of taking a flat or floor together, or the "bachelor maid's" quarters, would be entirely practicable. If half a dozen ladies wished a good mender one day each week, or a cleaner, parlor maid, etc., the time of one girl would be regularly filled. It would be possible to benefit every class of homes, from the woman who does her own work to the one who entertains constantly. As the number of skilled workers increased, something like the New England kitchen or department store for cooked foods might be developed, when families were sure that the food thus supplied was prepared under strictly scientific, hygienic and sanitary conditions. This is already being done on a small scale in a mountain club, where the most isolated cottage, occupied by a gentleman under treatment for nervous prostration, has a housekeeper in charge who takes care of the rooms, makes tea and coffee, cooks eggs, chops, steak, etc., and all other foods are sent from the club kitchen ready for the table, or if necessary are freshly heated. The plan has given complete satisfaction.

The state of New York has this year made a special appropriation for establishing a school of forestry, the first in this country, though the need has long been felt. There are already two state schools for training librarians. Is it too much to expect that the coming century will see state schools of household economics, when our need is fully realized, and women have determined to bring science into the home, as it is being brought into all phases of work in order to obtain the best results?

The Bright Side of Farm Life.

By Mrs. G. R. Smith, at Farmers' Institute, Franklin, N. Y.

Doubtless many think a pastor's wife does see the bright side of farm life. She is invited to the farm homes to eat warm sugar, strawberry-short-cake, Thanksgiving turkey or any other thing which is specially nice, and knows nothing of the hard work. All this is certainly a very bright side of my life; but there is no kind of work which falls to the lot of the farmer's wife or daughter that I have not done. From picking up chips—yes, and picking potato bugs, driving cows from the pasture and working grafting wax for father while he grafted his apple trees when I was a little girl—to caring for an invalid mother and doing the work for a herd of ten cows, when milk was set in shallow pans. I've been through it all. I know how tiresome the milk work is on the sultry summer morning when one has enthusiasm for nothing. But even the great pile of milk pans to be washed had a touch of brightness for me. They helped me partly forget my anxiety for my mother, and so they rested me. They have a bright side for you too. It is that you do not use them. Present-day methods of dairying are much easier.

There was a summer vacation later, when Mr. Smith and I ran a little farm of 20 acres and were as happy as kings and much more independent, and left it in the fall richer by the winter supply of fruit and vegetables. So you see I've seen all sides of farm life.

We often lament that we have not as good schools or as long terms as town people. I'm not going to admit that you have not as good teachers as we, for I taught a country school myself for four terms. Afterward I taught in a large town and I found that it took my village pupils ten months of their school year to do the work that my country pupils of the same age and intelligence had accomplished in six. I was wonderfully discouraged and sought the reasons that I might remove them; but found them almost wholly beyond my reach. In too many cases the town child enters school in the morning tired and listless, because he was out the evening before, on the street or in the stores or pool rooms. He cannot put his mind to his work because it is full of the gossip, profanity and vulgar stories of his evening associates. The mind that is filled with the rubbish of the cigar shop can not hold the pearls of knowledge. On the other hand, the country boy enters the school room as fresh and brisk as the pure country air he'd been breathing all the morning. He goes at his work with a will, because his months of school are so few that he is hungry for his lessons. There is just as much difference between teaching the child who is hungry for lessons and teaching one who is kept at them all the time, as there is between feeding a child who is hungry and feeding one who is eating all the time. There is just as much difference in the assimilation, too. The child who takes his lessons with a relish will appropriate them and use them with vigor; while the one who is crammed, finds his learning only a burden. I believe this one great reason why so large a majority of our eminently successful men in all callings are country boys "grown tall".

For a family home there is no place like the farm. Surely this one thing should go far to lighten any clouds which hang over the life of the farmer and his wife. Our children, the best gifts God sends us have a better, purer, pleasanter home on the farm than we could give them anywhere else. I do not mean that the poorest farm home is better than the best city home. I mean that if you compare your home with the home of a man of your own wealth and ability in the city, the farm home is far ahead every time; and there are some advantages which the poorest may enjoy in the country that no amount of wealth can buy in the city. The room of the farm is no small factor in the problem of a home. When we moved to Franklinville, my littl four-year-old boy preceded me to our house, and when he met me at the door a half hour later with his eyes shining and smiles all over his face, he exclaimed, "Mamma, I can go clear 'round the house." "Clear 'round the house." How much the one sentence told!

Oh! You mothers whose children may run at will over your own broad fields and beautiful hills, imagine if you can the problems of the mother who has for her child's play-ground only a bare, sun-baked back yard, shut in by city walls. This is the lot of the better class of city people, those who pay from $300 to $500 a year for rent. Do you wonder that my children think of grandmother's farm with its orchards and tennis court, its swing and croquet grounds as an earthly paradise?

I know of no other business in which the bright side overlaps the dark so much as in farming. Take the first necessity of life-food. Who ever heard of a farmer with the first particle of push, starving? He may not be able to live on blue points and canvas-back duck, and wear lilies of the valley as a boutonniere the year round, but some form of good food and necessary fuel he may be assured of. New York farmers do not know what suffering is. You are so accustomed to being well fed and cozy that you forget that it is not so everywhere. Six years ago we were living in the heart of industrial Pittsburg, during the great iron strike of 1893-4. I wish I could make you understand what life was like there. Day after day thousands of men in thinnest clothing, with the look of famine in their faces, marched miles through the bitter cold to the "Charity Relief Station," to try for work at any price, only to be told, "Only half of you can work, there is not money for all. Those who work to-day must be idle to-morrow." One dollar once in two days to provide for a family where rent must be paid and every scrap of food and fuel bought! Try it for a week, estimating your rent, food and fuel at prices you receive in market, and you will thank God more truly than ever before for the plenty which surrounds you. Mothers! What would it mean to you to be obliged to send your children to school to keep them warm, because there can be no fire at home; to have to take your baby on the street and beg at the doors for milk to keep life in the little shivering body? And through all the want and misery, the beer wagons were running and the saloons were bright and warm. No wonder that the despairing men, worn out with tramping the streets for work, aching with cold and half-crazed at thought of the loved ones at home without food or fire, crept into these open doors of hell for warmth and forgetfulness.

In remembering your blessings this shall not be least—the saloon is not on every corner of the country road.

Bird Study.

By Mrs. A. B. Johnson, Caledonia, N. Y.

No department of natural history surpasses ornithology in attractiveness, and its resources are almost inexhaustible. Birds may be found everywhere. In the city parks and suburban groves, careful observation reveal objects for study even in the depth of winter. The study of bird life is quite as interesting to the older people as to the younger. Surely, every country boy or girl may have as good an opportunity as did Longfellow's "Hiawatha," who—

> "Learned of every bird its language,
> Learned their names, and all their secrets,
> How they built their nests in summer,
> How they hid themselves in winter,
> Talked with them wher'ere he met them.
> Called them Hiawatha's chickens."

And it is very likely the birds would say as they did to the proud young Indian lad as he journeyed through the forests with his bow and arrow—

> "Do not shoot us, Hiawatha,
> Sang the robin, sang the bluebird,
> Do not shoot us Hiawatha."

There are known to be between 7,000 and 8,000 species of living birds, many rare and attractive, all interesting for study. Of North American birds alone, there are more than 1,200 species. Of this number but a couple of hundred may be called fairly plentiful in the temperate parts of the United States. Birds may be classed as migratory and resident; the former are numerous, spending the winter season in the south and returning north on the approach of spring. The latter remain with us throughout the entire year. Of course, only those remain that can subsist under almost any circumstances, nor do these resident birds have the entire country to themselves in the winter. There are birds who immigrate from the extreme north, such as the snow bird and grosbeaks.

Many birds of no special beauty of plumage seem far more interesting than those of brighter colors and prettier song to recommend them. Many of the plainer birds have indications of a great deal of intelligence which may be studied with increasing interest. Birds are more musical at certain times of day as well as at certain seasons of year. Between dawn and sunrise occurs the grand concert of the feathered folk. There are no concerts during the day, only individual songs. After sunset there seems to be an effort to renew the chorus, but it cannot be compared with that of the morning.

Just what meaning should be attached to a bird's notes will very likely never be discovered. They really do seem to express nearly every feeling of which the human heart is capable.

There can hardly be a greater pleasure than in watching the nest-building of birds. The intricate work in weaving the beautiful nests of many birds is truly wonderful. Some observers affirm that, like the human builder, the bird improves in nest-building by practice; the best specimens of architecture being the work of the oldest birds. Senses of sight, smell and hearing are remarkably acute in birds; this is especially true of sight. Some have three eyelids, the upper and lower and a membrane that can be drawn down over the entire eyeball, enabling them to look directly at the sun. Eagles, hawks and owls are thus provided. The best method to arouse an interest among the children is to go with them into the fields and groves and assist and encourage them in the study of bird-life as they find it; have them bring in written descriptions. As a guide, use the following points: Shape, size, prevailing color, marks on head, wings, throat, or tail; shape of bill, length of tail, where found, whether on the ground or in trees. When the nest is found, describe its construction, where found and if there are eggs, give the color and markings, number, etc.

It should not be over-looked by the young observer that if he would learn to recognize at once any particular bird, he should make himself acquainted with the song and call notes of every bird around him.

Many birds bear names given them by their own peculiar cry. Listen: "See-see Dick, Dick, cissel cissel. You call me the little meadow lark, while all the time I am trying to tell you as plainly as I can what my name is; to tell the truth I don't belong to the lark family at all. Simply because I wear a yellow vest and a black bow at my throat does not make me a lark. You can't judge birds any more than you can people by their clothes. No, I belong to the finch or bunting family, but I am called the Dick cissel."

Who is that little fellow we may see frequenting the wood land when it is not too wet, his note is about the only one heard at noonday, during mid-summer. "Teacher, teacher, teacher, teacher, teacher," is it some child-voice calling his teacher. No, it is a species of thrush, commonly called the "Teacher bird." It is also known as the oven bird, the name being derived from its peculiar nest which is fashioned like an oven.

The preceding may be considered the sentimental part of bird life; we will endeavor to speak of something of economic value. Every one knows in a general way that birds render most valuable service to the farmer, both in the field and in the orchards. Investigations have been made to determine just what such services are. Results have been striking and can no longer be ignored. In many places some of our sweetest songsters and most useful insect destroyers have become scarce or have entirely disappeared. The great value of insectivorous and granivorous birds cannot be overestimated. Thus, while the chickadees, woodpeckers and other winter birds are ridding the trees of insects, eggs and larvæ, the granivorous birds are reaping a crop of weed seeds, which left to germinate would cause a heavy loss to our agricultural interests. The fact is evident to all who have given any attention whatever to the subject that if the cruel and useless slaughter of birds is not soon checked there will be obliteration from regions where in former years they were abundant.

This is true of the humming-bird, blue-bird, wren, common quail and ruffled grouse; also the heron, pelican and many smaller birds of Florida. The causes are many but the greatest is thoughtlessness on the part of young and old of both sexes. Tommy wants a gun—he teases persistently until his fond parents finally submit and one is procured—Tommy tries his marksmanship, result: he shoots all the birds he can in his vicinity.

Collectors of eggs are also responsible. Forest fires are another source of this destruction and many of these fires are known to be the work of incendiaries. Fashion at present, is the greatest enemy to bird life; when the ladies need new bonnets nothing else will do for adornment; though 10,000 sweet songs be hushed forever. The killing of the white heron, for example, to procure the much prized aigrettes for millinery purposes. By far the life of a greater number of these birds are sacrificed during the nesting season, when their plumage is brightest. It has been known that the slaughter of marsh and maritime birds has been followed by an increase in human mortality among the inhabitants of the coasts, the birds having formerly assisted in keeping the beaches free from decaying animal matter.

Not many years ago, New Orleans had a plague of bugs, just as the yellow fever began, and strange as it may seem the bugs proved far more troublesome than the disease. People called it a mystery. Scientists declared it was merely the result of man's improvidence in destroying the birds. Nature surely had revenged herself on New Orleans.

There is no bird that can compare with the chickadee in destroying the cankerworm moth. It has been calculated that one chickadee in one day destroys over 5,000 eggs. A certain man attracted chickadees to one of his orchards, feeding them there in winter, and he says: "that in the following summer while trees of the neighboring orchards were seriously infested by cankerworms and caterpillars, the orchard where the chickadees had been, no serious damage was done by the worms or caterpillars."

The Baltimore Oriole or golden robin, is remarkably familiar and fearless of man, hanging its beautiful nests in our garden trees. He is one of the most interesting features of country landscape. In the spring the oriole's food consists almost entirely of caterpillars, beetles and other insects that injure the trees and fruit. There are few birds that do more good in this way. Though sometimes they eat our grapes from the vines and peck at the fruit on the trees, it is usually because they want a drink that they do this. One good man placed pans of water in his orchard, and he soon noticed that not only the orioles, but other birds came to the pans for a drink instead of disturbing the fruit.

All woodpeckers, of which there are many varieties, are of vaule to the farmer. About three-fourths of their food consists of insects, wood-boring beetles, many caterpillars, mostly those species that burrow into trees, and many ants that are particularly harmful to timber, these insects not being accessible to other birds, are sought after by the woodpeckers, whose beaks and tongues are especially fitted for such work, dig out and devour them.

If the farmer only thought of it, he would begin to think that part of every corn crop rightfully belongs to the blackbirds. When the corn is young he cannot see the grubs, but the birds can and they take many thousands in a day. These birds have been much abused on account of the farmer not knowing that they actually more than compensated him for the mischief seemingly done, by the benefit they confer in the destruction of grubworms and other deadly foes whose secret work destroys vegetation.

The robin—often called "morning bird," glad harbinger of spring, wakes us with his warbling early in the morn. This bird courts the society of man following closely upon the plow spade and hoe. To be sure he feeds for a month or so on our strawberries and cherries, but his general diet is that of insects and worms picked out of the ground. He destroys the larvæ of many insects in the soil and is a positive blessing to mankind.

In regard to larger birds, which are called birds of prey, such as the owl, hawk and crow, the uninformed farmer considers them his enemies, but nearly all species render great service in destroying many field mice and ground squirrels and other small rodents, harmful to vegetation.

Some writer has said, " if all the birds should die, not a human being could live on earth, because the insects upon which the birds subsist would increase so enormously as to destroy all vegetation and that birds save for agricultural purposes alone annually, $100,000,000 in the United States."

Can one imagine a summer time without the songsters! No happy morning song to greet the early riser, no sweet melody to cheer the plowman as he enters upon his daily task, no bright-tinted object, fluttering through the leafy boughs of bush or tree!

Let us cherish these winged creatures as gifts from an all-wise Providence, for without them the world would be more barren than we think.

Would it not be a good plan to increase the intelligence of the present and rising generation respecting the value of birds, by introducing into our schools the study of bird life. Through the wise co-operation of our school boards suitable text-books may be procured which will supply the knowledge needed in regard to the great value of these often-abused creatures, and arouse an interest in their protection. The Audubon Society of the State of New York, which was formed February 23, 1897, together with other societies, have done much to prohibit the useless slaughter of these feathered tribes. But the universal custom of wearing birds and their plumage is of too long a standing to be changed in even a few years; it must come through education, a knowledge of their great value to the world. The Audubon Society found already laws existing, if enforced, adequately to protect our birds. The Audubon pledge does not prohibit the use of ostrich plumes or the feathers of the domesticated fowls.

Let us, fellow teachers and fellow citizens, take up this work of bird study and protection. Let the schools teach it, let the press print it, the pulpit preach it till from thousands of happy throats, shall be proclaimed the glad tidings of good will of man toward the birds.

> "T'is always morning somewhere and above
> The awakening continents, from shore to shore,
> Somewhere, the birds are singing evermore."

Nature Study.

By Anna McPherson, Garbutt, N. Y.

This subject has a wide range and time will not permit any discussion regarding its early history under Froebel, and its evolution in America, until to-day the American kindergarten leads the world in its methods of following nature in the education of children.

We shall talk of nature study in our common schools, and its practical value to the farmer. Farmers in general recognize the fact that agriculture is of vital importance among the industries, and realize that they must understand the natural elements with which they have to deal and the best methods of exterminating or resisting the attacks of injurious insects which are rapidly increasing, both in number and variety. (Professor Slingerland says at the rate of 7,000 new kinds per year. The United States have 33,000 out of a total of 300,000 known varieties.) Had these subjects been taught in our country schools fifteen or twenty years ago, the farmer of to-day would be better prepared to meet the difficulties now confronting him. Farming has indeed become a science, and a successful farmer or fruit-grower of to-day requires a much broader education than in most lines of occupation which we might mention. A country child is in nature's laboratory with all nature about him, and as the average student's school life closes at fourteen or sixteen years of age, why not begin his education in childhood and thus develop a love for farm life and agriculture. While in our country schools the common and frequently higher English branches are taught, it is astonishing that little or no instruction is given that will aid in a practical manner those wishing to follow this branch of industry. Our educational system, excellent as it is in some respects, could be made of greater value by helping the student to obtain a knowledge of the forms of life about him through observation and personal research, thus arousing his dormant capabilities and securing the harmonious development of all his faculties, often giving an incentive to further study.

It seems to be the fad now to make the child appear "smart" rather than "substantial", and through a system of cramming a superficial knowledge of books is obtained without knowing how to put it to practical use. They have not learned to do by doing. It is not enough to learn the principles of mathematics and science, but we must know how and where to apply those principles in our avocations. Childhood is naturally active, observant and inquisitive. Children see many things in the natural world they do not understand, and are continually thirsting for knowledge. Do we recognize this in their education? Do we realize its significance and encourage them to develop powers of observation? We do not! From his earliest school days books are placed before the boy, his memory alone is trained until nearly over-burdened, while his eyes and ears are left to train themselves, with the result they are gradually closed to the wonders and beauties of the natural world, and he steps forth only partially equipped to take his position in the struggle of life.

Ruksin says: "There is no moment of any day of our lives when nature is not producing scene after scene, picture after picture, glory after glory, and working still upon such exquisite and constant principles of the most perfect beauty that it is quite certain it is all done for us and intended for our perpetual pleasure." Not many of us see these masterpieces nature places before us, because our eyes have not been trained to habits of observation. No one can appreciate the works of nature without knowing nature, and to know her you must get nearer to her and study how she works. A student, boy or girl, who has learned to observe and can describe correctly so apparently as simple a matter as a leaf, insect or bird, has learned the art of accurate and rapid observation, which will be of infinite value in any position in life.

For instance, take it on the farm. It is not the big burly boy or man who can perform prodigious feats of strength, breaks all the handles in your pitchforks and smashes things generally, breaking more implements than he's worth, who is in greatest demand and receives the highest wages. Rather, who does not prefer the one who works intelligently with his brain, eyes and hands in harmony; who does not have to be told twice how to do a thing, but comprehends immediately and does it; nor stops five minutes to *think* before he can *see* what he is doing; who, when sent to the garden to hoe the weeds out will not also root up all the vegetable plantlets, never having noticed the difference between vegetable plants and weeds in their first stages of growth? Yes, we've all seen just such *help*. Intelligent help on the farm is getting scarcer every year, yet what men we are obliged to hire demand the same wages a skilled laborer is entitled to. In nature study we have a remedy.

Not only on the farm, but in any position, be it messenger boy or bank clerk, the one with a quick observant eye is better equipped for positions of advancement, and the one not so endowed must cultivate the habit if he wins success in life. The Indian who roamed through these trackless forests before the advent of the white men had so trained the eye for generations, that they were able to tell from an indistinct footprint how many hours had elapsed since the foot had pressed the ground, and could follow the trail for miles, which to a white man's eye showed not the faintest trace. You have heard of the man traveling in the Orient who lost his camel. In his search for the animal he met an Arab of whom he made inquiries for the missing beast, but he said he had not seen the camel. After further conversation the Arab asked the traveler if his camel was lame on its left hind foot, blind in its right eye, and carried meal in its pannier. The traveler answered yes, then you have seen my camel and can tell me where he may be found. The Arab said no, I have not seen him, neither do I know where he is, but as I came this way I noticed birds of the air picking something from the ground which I found to be meal, the footprints showed me a camel had passed this way, and the impression from the left hind foot being indistinct I knew he was lame in that foot. I also saw that the grass on the left side was cropped close, while that on the right was untouched; from this I knew he was blind in his right eye. All these signs the Arab had observed and traced, and though equally plain to the traveler, he had not seen them, and could hardly be convinced the Arab spoke the truth. We thus see the value of natural science, which has been defined as "consisting of two things, seeing what you look at and drawing proper conclusions from what you see." Not only in country, but in city schools is the need for nature study felt. A recent paper states:

> "At an examination in many of the public schools in Boston, Syracuse, Kansas City, St. Louis and other of the larger cities, a surprising ignorance of natural objects was shown; very many of the children had never seen a bee hive, bee or a hen; did not know what a snake or a toad looked like; could not describe an insect, and had no idea what a butterfly was. It was recommended that some of the subjects now taught be dropped and nature study substituted."

How many children of the age of twelve or under, can tell a bass wood tree from an elm, a cherry tree from a maple with the leaves on or off? What appears first on a fruit tree, the leaves or blossoms? Why can a fly walk on the ceiling? How does the grasshopper sing his song? How many teeth has a cow on its upper jaw? How many teeth has a hen? You laugh at this, but I doubt if one child out of twenty can answer these questions correctly, yet they are subjects which are met with every day. As our prosperity depends in so large a degree upon the cultivation of the soil and plant life, why should not our boys and girls be educated to a knowledge of nature by bringing them into direct contact with her work. Make nature study real and personal; teach the children to know the plant, its habits, its family, and its enemies by actual observation, so they may be able to tell a pumpkin plantlet from a burdock or a radish plantlet from a rag weed. You think you can do so now? Well, perhaps; try it this spring. A young lady was given some very small verbena plants in their second leaf which she carefully planted, tenderly watched over and watered, anticipating great pleasure in her verbena blossoms, imagine her disgust when she found all her care had been bestowed upon catnip plants. Now suppose we study the little plants this summer so we may be able to detect the difference in the several varieties of seeds and plants and not raise a crop of something we do not want.

I recently heard of a bicycle party on a country run who were very much attracted by a beautiful plant they saw growing in a garden. This plant had tall stalks of dull green over topped with silvery bloom. Every one halted to admire the beautiful plant with exclamations of delight. Finally one of the party asked the "man with the hoe" who was at work near by what those beautiful flowers were. He looked around in surprise, then asked her what she meant. Why! those lovely plants along the fence. I never saw anything like them before. He smiled a pitying smile as he replied: "Them! Why them's onions gone to seed."

Children are enthusiastic admirers of trees, tell them their names, habits of growth, what makes them grow, length of life, when the buds and blossoms appear, when and why the leaves fall. Tell them of its countless enemies which destroy fruit and leaf. Teach them how to recognize these insects, their nests, eggs, etc., so as to destroy them. (Those are the nests the small boy would more profitable destroy than the helpful birds' nests.) The practical results of this method is demonstrated in California's rich fruit belt, where entomology is required in the schools and the children are actively engaged in destroying the pests. If such a method were adopted in New York the tent caterpillar nests would not be found in nearly every tree and orchard along our highways, a blot upon the landscape and a menace of what we may expect from the same quarter next season. Our forests also suffer from the depredations of insects.

Entomologists give between 500 and 600 distinct species that attack the oak, 100 the elm, nearly 200 the hickory, over 125 the willow, nearly 200 the pine and hundreds the other evergreens, over 100 the maple. During the past year the depredations of insects in many localities have been so destructive that the farmers are obliged to cut down their beautiful maple groves, being a loss of many thousands of dollars to them. We have many faithful allies who will help us in destroying this vast horde of insect enemies if we will but recognize and protect them. All insects are not injurious, some are beneficial and we should be able to discriminate. Then come the birds. Who does not love the birds and welcome their cheerful inspiring song when they return in the spring!

In portions of Alaska there are men, women and children who never heard a bird sing (imagine it if you can) and their delight was unbounded when they first heard a canary bird warble. The birds are man's best friend; without them the earth would be uninhabitable. Thus we should teach the children they are to be protected, not alone because of their beautiful song and color, but by a wise Providence they prevent the undue increase of insects, destroy noxious weeds and in many other ways are helpful to the agriculturist. They should not be stoned, hunted or destroyed in any way, the victims of small boys and boyish men who think it manly to take life merely from love of sport. Instead of buying a gun take the money and buy a field glass and study the habits of birds and animals about you, and I'll venture to say you will get more real, pure pleasure from that kind of sport.

Snakes and toads are interesting objects of nature study and should also be protected as being of value to the farmer. There are very few poisonous reptiles in our section of the country and we should discourage the killing of harmless snakes which are really as valuable as the ungainly and useful toad. Insects form their article of diet; cut worms being a favorite dish. On the whole they are beneficent creatures and our prejudice against them is rather the result of their evil look and reputation, together with our ignorance in regard to their utility.

Moles and skunks are also friends of the farmers which are being exterminated through ignorance of their usefulness. A study of their habits, food, etc., would furnish an interesting field of observation and result in much benefit to the agriculturist. If all these allies were protected as they should be, they would not be obliged to spend so much time and hard-earned money on insect poisons, etc., as they are now doing.

A clever teacher may take up nature study in our schools, without its being an added recitation. To begin with make it a rest exercise once or twice a week and give such subjects a wide range of adaptability from the primary to the highest grades. Do not stop during the winter months, there are always objects awaiting our investigation. As soon as a genuine interest in nature study is awakened in the children and teachers, you will be surprised at how many interesting objects the pupils find to bring in for study, and cabinets of plants, insects, and minerals will be formed, all which will be of benefit not only to the pupils, causing them to take an interest in farm life such as they never had before, but interesting also to the parents who never had these privileges, and to whom the child rehearses the new things he has learned during the day. The book of nature once open to him, the printed page will be more interesting and an appetite awakened which will be satisfied only with wholesome food, and the weak, harmful trash found on the news-stands, will be voluntarily rejected. Over and above all, in this study of nature the student will be led to see the marvelous symmetry and minuteness of finish, in the very humblest of plants and animals and will be constrained to love nature and reverence nature's God, thus morally elevating and uplifting to nobler, higher aims.

Let the farmers urge on and assist in every way possible that the study of nature in our common schools may become popular. When anything becomes popular we may look for success. Thus we may easier obtain intelligent help. The farmer's boys and girls will learn to love their home and farm life, the city have less attraction for them, and the farmer's family will be raised intellectually to a higher and more prosperous plane, and be able to keep pace with the progress of civilization, and thus be in a position to take their proper place among the learned professions. The terms "hayseed" and "clodhopper" will be applied no more to the American farmer.

> "Nature never did betray the heart that loved her,
> 'Tis her privilege thro' all the years of this our life
> To lead from joy to joy;
> For she can so inform the mind that is within us,
> So impress with quietness and beauty
> And so feed with lofty tho'ts
> That neither evil tongues, rash judgments
> Nor the sneers of selfish men,
> Nor the greetings where no kindness is,
> Nor all the dreary intercourse of daily life
> Shall ere prevail against us."

I understand Cornell University has established summer schools and prepared papers on nature study for teachers so as to qualify them to develop the latent powers of observation in their pupils. The state normals have neglected to include this among their methods which we trust they will do in the near future. Would it not be a wise plan for every one who can spend but ten or fifteen minutes each day in reading, to send for these papers (they may be had for the asking) and study one of the most important sciences of the day.

Unseen Opportunities.

By Rev. F. W. Moot, Johnstown, N. Y.

We are living in a wonderful age. We cross the continent or the mighty ocean in five days; we talk with a friend a thousand miles away and recognize his voice; within an hour we can communicate with almost any portion of the civilized world; we travel, we read, we warm ourselves by that mysterious agent, electricity; an event occurs in South Africa and within three hours the newsboys are selling for a cent, printed newspapers containing an account of the affair. When we pause and look back two, four, five or ten centuries at the conditions and inconveniences of our forefathers, and then at all the wonderful achievements of the nineteenth century, we are tempted to believe that we are living in another world or, at least, under some new laws of nature. But we are not. This is the same old earth, and the laws of nature are the same as when man first saw the light of the sun. There is but one thing that makes this age so marvelously superior to any other—the men of this century have *seen* what was *unseen* by their ancestors.

There is but one reason why Christopher Columbus did not cross the Atlantic ocean in a steamboat instead of his sailboat—men did not then see the power in steam which had ever been open to their investigation. It remained an unseen opportunity until Watts and Stephenson and Fulton put it into practical use. There is but one reason—the unseen opportunity—why the Magna Charta, which was signed by King John, of England, June 15, 1215, was not printed the next morning in a daily newspaper. The act of writing had been known for ages, but the opportunity in movable type was unseen until 1438, when Gutenberg presented it to the world. The defeat of the heroic band of Spartans at the pass of Thermopylæ, 480 B. C., might have telegraphed to Sparta, only that the possibility of sending a message over an electrified wire was unseen until 1844, when Prof. S. F. B. Morse sent the first message which marked a new era in the histotry of civilization. Our forefathers might have had the moving machine, the threasher and cleaner, the sulky plow, the graindrill, and a hundred other convenient farming utensils. They had wood and iron and knew how to work in these, but they failed to see how to put these together as men of later date have discovered.

Not only in invention have men failed to see their opportunities, but in every vocation and calling of life there have been golden opportunities which had we seen and improved would have resulted to our great advantage. Some of these may be beyond the penetrating power of our vision, but hundreds are lying all about us which may be seen, and which if improved will improve the condition of any preacher, lawyer, merchant or tiller of the soil.

In this age of multi-millionaires, there is a widespread desire among men to become rich. Wealth honestly gotten and rightly used is a blessing, and this rule applies to man whether he has twenty thousands or twenty millions of dollars. It is not *money* that is the root of all evil, but "the *love* of money is the root of all evil." The desire for a large competency has found a resting place in the bosom of many a tiller of the soil, but in the process of his way of farming and the hardness of the times he has not realized his fond hope of wealth. Perhaps to-day in his despondency he has concluded that if he ever is going to be rich, or does not desire to end his career in the county almshouse, he must get off the farm, for there is no money in farming. But before any man leaves his farm to make a larger competency in the world, it will be wise to sit down and count the cost. Many a farmer who left the farm to gain wealth in the world has years afterward discovered that he and his fortune separated when he moved off the farm. I have known some remarkable instances of this character. Several years ago a man was living on his farm in Pennsylvania. His brother in Canada sent him word that he had discovered coal oil and thought he would make a fortune. The brother in Pennsylvania sold his farm for $833 and went to Canada to make a fortune by finding coal oil. He did not find it. But the man who purchased the farm for $833 discovered coal oil on this very farm which his predecessor had deserted, and the total value of oil taken from that farm is estimated at $100,000,000.

A farmer in California learned in 1850 that some one had discovered gold a few miles south of him. He sold his farm and hastened to the new gold field to make a fortune. The man who purchased the farm built a mill on the bank of a stream which flowed through the farm. His little daughter took some of the sand from the stream and carried it to the house. One day while she was letting some of this sand run from one hand to the other her father saw some bright glittering particles in the sand. He examined it and found it to be gold. That farm has grown to be one of the richest gold mines in California from which over $129,000,000 worth of gold has been taken. Your farm may not have hidden in its bosom coal oil or gold, but it may have treasures which proper tillage may unfold.

Some seem to think that money can be made only in the large cities. But a census of 107 millionaires in New York city in 1889, revealed the fact that only eight out of the 107 had made their first million in New York. The other ninety-nine had made their first million in some small town or city. There are farmers who have been and are making money on the farm, but they are those who are improving what to many others are "unseen opportunities."

In your marketable produce study to learn what people want. Some people seem never able to learn that the public will not buy what it does not want, but will buy and pay a good price for what it does want. Some merchants compain because they do not have what they believe is their share of patronage. If they deal honestly and get what the public wants, patronage will come.

A. T. Stewart is said to have begun his career with $1.50. He invested 88 cents in articles that people would not buy because they did not want them. In this experience he learned what they did want, and invested his remaining 62 cents in these and easily and readily sold them at a profit. All his life he acted upon this principle and died leaving a fortune valued at $40,000,000. John Jacob Astor in his early life closed a mortgage on a millinery store in New York because the parties could not pay the interest. However, he retained them in the store with instructions to take apart all their made-up goods which were unstylish. He then went out into Central Park and when he saw a beautiful, stylish hat he went directly to the store and had one made like it and placed in the window. This he did until the store was full of stylish hats that ladies wanted. The result has been that the profits from that store have amounted to over $17,000,000.

A farmer in Indiana had a great many fatted hogs which he could not sell at any price. He went to Boston with his wife, resolved if he could find anything to do he would give up his farm and hogs, which nobody wanted. While in Boston he saw canned gooseberries selling at 60 cents per pint. He hastened back to his farm, sat out gooseberry bushes, and began the culture of berries, canning them within two hours after they were picked, that they might retain their freshness and tart. His gooseberries were sold in New York for 75 cents per pint and to-day he is one of the largest taxpayers in Indiana.

An old man lived on a small farm in Vermont and each year tapped a maple tree in front of his house, making a little syrup from the sap. After 40 years of life on this farm he was still poor. One day while making some maple sugar he made it into maple crystals. They were so delicious to the taste that he interested some large maple-sugar manufacturers in the scheme and in eight years was worth $280,000. "Unseen opportunities" in learning what the public wants.

A man living in Boston was paying 12 cents per quart for the milk used by his family. One day he learned of a milk dealer that he was selling his milk for six cents per quart. The man went home and ordered his wife to buy her milk of the six-cent-per-quart dealer. She did so. The first morning it was poured into the coffee, the husband drank his, but the wife only tasted of hers. The next morning the husband drank only part of his, the wife's was untouched; but they had saved six cents. The next morning neither of them used any milk, but the husband lifted the cream pitcher to his face, and smelled of its contents. He set it down and said: "Wife, after this buy your twelve-cent milk." He afterward learned that the stables of the six-cent dealer were filthy and his care of his cows and the milk unclean, while the other groomed his cows, allowed no manure to remain in the stable, and in every way exercised the greatest care, that his milk might be of a superior quality. He made money, knowing there is always a class of people who will pay a good price for a superior article.

Mark you, you never will succeed in selling wormy apples, small, diseased potatoes or blue milk. The majority desire pure and excellent quality. "Old Abe" was right when he said: "You can fool all the people some of the time, and some of the people all of the time, but you cannot fool all the people all the time."

Know the cost of production. In the commercial world every man knows the cost of his goods from a locomotive down to a pin. It is the basis of success; it is the indicator of profit and loss, of fortune or failure. Strange, is it not, that with this object lesson before them nine-tenths of our farmers do not know the real cost of their produce, and when they sell do not know whether in reality they have made or lost money. It may be easier for the merchant, who buys his goods by the dozen or gross, to ascertain the cost of each article, than for the farmer, but it is no less important that you should know the cost of your products.

A little common sense and a little system will help you very much. For instance, in your hog-house build a bin with partitions for different kinds of grain. Put in a convenient place a small note book with a pencil tied to it. When you buy six pigs for $2 each, put it down in the book. When you put ten bushels of corn, or other grain in the bin write it in the book, with its market value. You need not keep account of the milk you feed as it has no market value. In the fall when you sell your pork, you can tell in a very few minutes whether or not you have made anything. If you have fed the hog $16 worth of grain, and only received $12 for it, you better stop raising hogs and sell your grain. The same plan can be used with the hens, and to a satisfactory degree in testing the worth of individual cows, weighing or testing otherwise the milk. You should know what your potatoes, corn, hay, etc., costs, that you may often chose the more profitable crop. Rotation of crops is necessary, but sometimes you can chose between two or three different grains in the rotation.

Study economy in production. The farmer cannot regulate the market price, but he can to a large degree regulate the cost of production, which means to him a larger profit. An Ohio farmer had raised potatoes for several years in the old way of cultivation. One day he decided to plant his potatoes with a potato planter, cultivate them with a cultivator, dig them with a potato digger, and store them in square bushel boxes to save time and expense in handling. He did so and reduced the cost of production one-third.

In 1897, at the New York State Experiment Station, two plats of potatoes were planted in the same field. Both were cultivated exactly alike, except when one was hilled, the other was left level. The value of the crop from the latter cultivation was $24 per acre more than on the plat where the potatoes were hilled. It is more economical to keep one $50 cow that gives 40 pounds of milk per day, than two $25 cows which only give 20 pounds each per day. Learn the food-value of that which you feed your live-stock. For one cent you can buy a postal card on which to write your address and send it to the Department of Agriculture at Washington, and they will send you a pamphlet telling the food-value of the various products of the farms.

Sell when your produce brings a reasonable profit. If you know its cost you will be able more intelligently to dispose of your crops. There is some perishable produce which you must sell for what you can get, but nonperishable produce, such as hay, grain, etc., can be kept until it brings more than it cost to produce. But don't be foolish and want an unreasonable profit. This has been the mistake of too many. I know of a farmer who had some pork which had cost him about $5 per hundred-weight. He was offered $9 per hundred-weight, but would not sell. This was in the month of March. He kept his pork until the following October, when it had cost him about $10 per hundredweight and then sold it for $7 per hundredweight. I knew of a farmer who had 16,000 pounds of hops, which had cost him about $1,600, and for which he was offered $16,000. He refused to take it. Afterwards sold them for about $2,000. I know of another farmer who in the last twenty years has had opportunities to sell his large hop crops at prices which would have made him worth to-day, $500,000. But he is not worth a dollar, simply because he was not willing to sell with reasonable profits.

Give the boys and girls on the farms a chance to have something of their own and by which each year they can accumulate a little money. If they expect to spend their life on the farm, try to give them an opportunity to learn in some agricultural school the more intelligent methods of farming. Always bring them to the Farmers' Institute, even if you have to keep them out of school for a few days. Go home to put in practice many of the excellent things that have been said at this institute. The power that willeth to do is the strongest power in the world. A sick woman was supposed to be dying. The funeral arrangements had been made, when she overheard someone saying the funeral would be on Friday at 2 p. m. She lifted her head from the pillow and said, "There won't be any funeral here on Friday." There was not. The next week she arose from her bed and lived twenty-five years. When Napoleon wished to carry his army into Italy, his generals said, "The impassable Alps." He replied, "There will be no Alps." And there were none to his indomitable will; for over the icy glaciers his soldiers dragged their cannon. Old Commodore Vanderbilt, when asked for the secret of success, said, "Secret? There is no secret. Intelligently attend to your business, and go ahead." Go home to see your opportunities and to improve them, and *you* will succeed.

The Church and the Grange.

By Rev. John Kincaid, Rodman, N. Y.

When asked to prepare a speech or a paper for this Farmers' Institute, the first and most difficult question to decide was "What shall it be about?"—trusts and expansion, Dewey and the Fillipinos, the Boers and the Transvaal—these are hackneyed subjects. They meet us in big headlines in the newspapers every day. The farmers, I thought, will want a rest from this class of questions. Of soils and siloes, blooded stock and sugar beets, Bohemian oats, orchards, meadows, grains and taxes, what is a preacher supposed to know? But there is one subject I have noticed which is of interest to everyone. Talk about politics and some will turn away in disgust. Talk of religion and some will yawn. Expatiate on the beauties of art and the blank look on the faces of your auditors may betray their lack of appreciation. Speak of business and the idler is unconcerned; expound science and many are bored; but talk to people about themselves and they are all ears. If a man be honest, he must confess that of all things which the Lord has made in the earth or the waters there is nothing of such absorbing interest to him as *himself*. It has been said that the greatest bore in the world is he who persists in talking of *himself* when you wish to talk of *yourself*. So I decided to say something about *ourselves*. Hence my subject, "The Church and the Grange." You represent the grange, I the church.

This is an age of fraternities, guilds and associations. Never since the Lord formed the first society, by putting the hand of Eve in the hand of Adam, has there been such a multiplicity of unions, fellowships and fraternities as at present. I heard a minister say, a short time since, that he belonged to seven different fraternal associations. I have been wondering since how, amid them all, he found time to kiss his wife or pray to his God. You, my brother grangers, represent one of the youngest of these fraternities and I one of the oldest; and together we represent two of the best. It is well that age and youth meet often. Each needs the other. In mutual respect and confidence they will find mutual profit. Every organization that has any excuse for being at all exists for a purpose. Life is too brief, its fleeting days are freighted with issues too grave for earnest men and women to band together merely to pass a pleasant hour in mirth and feasting. Their social pleasures are best promoted and most enjoyed when hand and hearts are united to forward some good cause. The society that endures and retains its place and influence in the world must stand for something. That its members are friendly, its gatherings inspired by mirth and good cheer will not alone give it an influence that is permanent. Associations that live only to minister to the present enjoyment of their members are ephemeral and soon pass away. Those continue and fasten themselves more deeply in the affections of the people, as the years go by, which embody in their principles and practices some one or more of the vital needs of the world.

The glory of the associations we represent is that they each exist for a definite, well-defined and noble purpose. Each represents an actual need of society. Each has specific ends to fulfill, the accomplishment of which will make the world better and happier. Looking in the Standard dictionary for the definition of a grange, I find it is "a lodge or local branch of the order of the patrons of husbandry, an order designed to promote the interests of farmers and to bring the producer and consumer nearer together." The interests of farmers and the welfare of the nation might almost be said to be identical. A nation's status among the nations of the earth is indicated by the degree of intelligence, industry and sterling character of those who till her soil.

In the welfare of farmers all are concerned. All, then, have reason to watch with no indifferent eye the work, progress and efficiency of the grange. To it a great work is committed—to see that farmers hold their own in the fierce competition of modern days; to seek an influential voice and vote in shaping legislation affecting farmers' interests; to stimulate each other to a broader culture, a wider and more intelligent outlook upon the great world and its conflicting interests; to make the farmer's home a center of refined and wholesome influences; to apply the ever-increasing knowledge of nature and her laws to the practical art of coaxing a world's sustenance from mother earth—surely these are reasons enough to justify the existence of a farmers' alliance. For purposes no less distinct and no less important does the Christian church appeal to the world for sympathy and support. To it is committed the mission of keeping the soul of man in touch with his Maker. History demonstrates the need of religious truth and religious instruction for the highest and best material prosperity. The church, the school-house, the farm—they are three indispensables to Christian civilization.

Now, for the best development of our respective interests, my farmer friends, I urge the importance of mutual esteem, sympathy, and so far as is practical and proper, co-operation. You have your distinct mission (a noble one), to promote the material and social interests of farmers. The church has its mission to all mankind (a sacred holy one), to bring the motives of the unseen and spiritual world to bear upon the hearts and consciences of men. Let us distinguish between things which differ. The church is not designed nor adapted to promote the welfare of farmers as distinct from other classes in society. Neither is the Grange designed nor adapted to take the place of the church in the promulgation of religious truth. Each organization will prosper and succeed as it adheres faithfully to its own sphere of action. One of our humorists, Josh Billings, has a lecture on milk. He begins by saying that he has read quite extensively on the subject in books and periodicals, but with all his research, the best thing he ever found on milk was—cream. The best thing we shall ever find as the result of the influence and efforts of any organization, is the results that it is designed and is by nature fitted to produce.

Being entertained a few weeks since at the home of a granger in a neighboring town, the conversation turned on the work of his grange. Among the questions which had been discussed there was this—"Resolved: That the Grange is doing more for the moral elevation of society than the Church." Some reliance had been placed upon one who himself never attended church, and was not a religious man, to support the affirmative. To the surprise of many he had very little to say and that little expressed his aversion to that class of questions. He said there could be no doubt in his mind, which had done the most for the good of mankind,—it was the church. More than that, he asserted that the church was the mother of the grange. If there had never been a church there would never have been a grange. It would do for him to say that. Being a minister, I should not wish to say it (although I might believe it), especially before a gathering of farmers. But is not such a comparison unnecessary and invidious? It engenders antagonism where there should be mutual good will and co-operation. There is no natural animosity between the church and the grange. The success of one in its own legitimate line of effort, only renders easier and more promising, the work of the other. If the daughter can outstrip the mother in any honorable undertaking, well and good. But let her be careful how, in the self-complacency of youth, she disdains that mother and seeks to get along without her. The field is wide enough. Hand in hand we should move forward each in his place with charity and good will to fulfill our mission. Much we have in common. Many objects of endeavor enlist alike the grange and the church. The great problems of our times appeal to us both as grangers and church members. The saloon, one of the blackest spots on our civilization, awaits our united action to banish its legalized temptations from our boys and young men. The congestion of population in the crowded cities presents problems which are of vital interest to us both. The growing power of consolidated wealth threatens the progress of Christian effort in our churches, as well as the success of the principles and objects which the grange seeks to attain. On these and many other kindred subjects, the grange and the church are in touch and in sympathy. Let us foster such a spirit of mutual respect and fraternal feeling towards each other, that as one by one these questions come before us for solution, the influence of our powerful organizations may be thrown unitedly upon the right side.

In their religious views the members of the order of the Patrons of Husbandry are probably widely divided. There are, I suppose, among your members, representatives of most religious sects and many of no sect and no positive religious belief. But on all great moral questions, those touching the sanctity of the home, the purity of the ballot, and freedom of conscience, you are, I take it, practically agreed. The church looks to you grangers with desire and expectancy touching these questions. It has a right to hope that on all issues calling for true moral discernment and decision, those whose occupation brings them so near to nature's heart will be allies of the church in seeking the purity, integrity and justice enjoined by nature's God. Manhood is the great need of the age. A manhood which rises above sect, and party, and selfish greed. A manhood which scorns the man, the uncharitable, the petty and the vile; that seeks not a life of ease through public preferment, but chooses a strenuous life of noble toil and sacrifice looking to the advancement of truth, justice and liberty for its richest reward. Where shall we look for the nurture of such manhood if not among those who, in the independent life of the farm, far from the temptations and vain show of the crowded metropolis, spend the early years of life. The boys of the farm, to-day, are those who will determine whether, in the new era of world-wide influence upon which our nation is entering, she will be true to the principles of fraternity and freedom that have made her great. The ranks of the legislators, judges, diplomats and millionaires are in every generation recruited from the farm. It is through the life blood of honesty, simplicity, frugality and industry, which has flowed from the rural districts in the past, that the national life has been kept vigorous and pure. Shall it continue to be so in the new and perilous future which is dawning? With you farmers, more than with any other class, rests the answer to that question, and the farmers of this great Empire State have a potential influence in shaping the destiny of America more decisive than those of any other State in the Union. The mortgage on the farm, and the incoming foreign tenant, mark the decadence of the class of citizens who have been the great balance wheel in our social and political life, the independent owners of the soil they till.

"There is a tide in the affairs of men which taken at its flood, leads on to fortune and to fame." The incoming tide of material prosperity is rolling in on us as a people. Let the farmers seize the opportunity it offers. Let the lessons of experience keep them from being swept away in the popular current of extravagance and speculation. Let higher intelligence and enterprise lift the noble calling of husbandry to a level with the learned professions in popular estimation. Let the farm life be made attractive to young men by substituting the lyceum and the literary club, for the nail keg and the three-legged stool in the grocery store. Let the farmer look beyond the boundaries of his own paternal estate and understand that his interests are involved in the general intelligence and enterprise of the community in which he lives. Let him understand that good roads are equally a factor in his success with well-kept stock, or well-ploughed fields. Intelligence, enterprise, public spirit—let these be the watch words of the grange and the characteristics of the church. Then hand in hand and heart to heart they will move forward to shape a destiny for our country which shall make her the renowned of earth and the greatest factor in peopling Heaven.

Sullivan County Farming.

By C. W. Heath.

Every occupation is necessarily subject to certain disadvantages peculiar to its line, varying in proportion to the complete nature of its surroundings; but taking everything into consideration, none are more exempt from these than the class engaged in agricultural pursuits. That this is so, is not at all mysterious when we consider the nature of their calling. Both in winter as well as summer nature is doing for them a work which it can do for no other class of men, and which actually costs them nothing, nothing physically or financially; such as the growth of cereals and other vegetation; while the grass, though withered and decayed upon the surface, is recuperating strength and vigor at the root for the coming spring; and the action of the frost has clarified the soil from impurities and to some extent destroyed innumerable insects detrimental to vegetable growth.

The great difficulty is that farms as a rule are too large, more so than can be profitably handled. If farming on general principles cannot be made successful on 50 acres in a state of good cultivation, it is useless to suppose that any additional number will prove more remunerative. The crops raised would prove to be not only equal in quantity, but far superior in quality, and consequently command a higher market price. As the ruling now is, fully one-third of the land tax is drawn from what is perfectly worthless under its present condition to the owner, hence a burden upon that of a more remunerative nature; thus the occupation, to that extent at least, is rendered unprofitable.

That those engaged in agricultural pursuits possess an average degree of prosperity is plainly manifest when compared with those engaged in mechanical labor of any description. While the latter, to a great extent, is dependent upon others, is in most cases a tenant at will and is obliged to purchase everything he needs for himself and family, the farmer employs himself at remunerative wages, is in possession of a home for himself and family and produces at least one-half of the necessaries of life.

In everything we undertake to do, in order to be successful, a certain amount of intelligence combined with the necessary capital and labor is always requisite. The merchant in order to do a profitable business must keep constantly on hand such a class of goods that pertain to his line as the wants of the public from time to time require. If he buys unseasonable goods at an unseasonable time they will accumulate on his hands and eventually so depreciate in value that his business will prove a matter of loss rather than gain, if not drive him into bankruptcy. This is equally true of the farmer. He must learn to adapt himself to the conditions by which he is surrounded. While physical exertion is the main factor in successful agricultural pursuits, nevertheless, unless guided by an intelligent knowledge of his calling, a great waste of energy will ensue. If we undertake to fight against nature we will be worsted every time. It is essential that the farmer should know the exact elements which are incorporated in the soil he undertakes to cultivate, to the end that he may adapt his crops to it; and should they be of such a nature that he does not desire to raise them, he must manipulate the soil to bring it into a condition adapted to raise the ones most desirable. When the hand and the brain work in unison together the highest type of successful farm labor is reached, and under no other conditions.

At a recent farmers' meeting the question was asked: "Why are not farmers more prosperous?" The consensus of opinion of those present appeared to be that their calling would not permit of their accumulating wealth as fast as business men do, nor as fast as their labor entitled them to, that their reward was not proportionate to their labor. While this is undoubtedly true, it is an erroneous idea to suppose that true prosperity consists altogether in the accumulation of wealth when, all things considered, it is only a secondary consideration, but consists chiefly in contentment and accompanying happiness, the offspring of a legitimate calling faithfully followed.

The naturally poorest land when in its virgin state is always good for a while, but must eventually succumb to over-cropping, unless liberally rewarded by stimulants in return for the tax imposed upon it. How far this can be done, is a question entirely dependent upon the amount of capital the owner is able to invest in that direction, and must be left with him to determine.

It seems to be the general opinion of those who have tested it that small fruit culture may be very profitably engaged in by anyone having the requisite quantity of land under a good state of cultivation. When once properly started, small fruits do not require any extraordinary amount of labor to keep them in a proper state of cultivation. Strawberries, although a delicious fruit and always saleable in season, require too much attention to make them profitable, unless they can be put in the market very early in the season, which cannot be successfully done in our latitude. The most reliable and best payers are raspberries, currants, blackberries and gooseberries. The last two require the least attention annually to secure a crop. So far these two have received but little attention in this section, but as their nutritive qualities are becoming better understood, they are fast coming into public favor.

Darwin, in his theory of environment and evolution, tells us that the fittest always survives. I accept no such view, for I have in my own limited sphere observed facts which contradict such an assertion. If he had said the *strongest*, he would, in most instances, have come nearer the truth. This is observable in the animal kingdom, the more powerful and ferocious preying on the more docile and domestic species.

Turning our eyes to the vegetable kingdom, we are met with the same condition of things, with but this difference—if we would preserve the fittest, that is the most essential—we must assist nature in developing her resources, promote their growth. Unquestionably all the varied and beautiful flowers which adorn our gardens, lawns and houses, whether of home-culture or the product of foreign soil, originally existed in a wild state, as evidenced by the fact that many of them are to be found in their primitive condition, where the foot of man had heretofore never trod. The fragrant violet, the beautiful daisy, the brilliant rhododendron, and the pale tinged lily, of whom it is said that Solomon, in all his glory, was not arrayed like unto one of these, which existed in years long gone by, would blush in the presence of its offspring of to-day.

It is a highly commendable feature of our day that in the construction of most of our modern houses, provision is being made for the culture of native and foreign flowers. They not only afford a continuous scene of delight to the propagator, but in many instances, are quite remunerative in their nature, as year by year they are becoming more popular with our people, an evidence that we are becoming more refined in our tastes. They cost but little, and everyone should cultivate them to the extent of their ability.

While it is true that farm produce is very low, it is equally true that all other productions are in line with it; so that while the farmer sells low he buys on the same basis; therefore, it is evident there is no discrimination in favor of one class more than another in the world's market. We may increase the amount of production, but we cannot increase the demand for its consumption; that is dependent upon the money market, the call for labor and the state of trade generally, both at home and abroad. When prices are good the farmer and the manufacturer are equally benefited. When prices range high the farmer receives as much in proportion for his produce as the merchant or manufacturer is enabled to realize in their respective departments, and thus things become evenly balanced, or as nearly so as it is possible to make them. In agriculture and manufactures there is no normal condition, for they never acquire a normal state and never will. Fluctuation is the natural outgrowth of increased and diminished demand and can never be regulated by any other standard known in commercial circles.

As regards the price of farm labor, which always pays better when employed on good than poor land, it certainly is as reasonable as that of any other employment, and if, as in a majority of cases, it is too high to prove remunerative to the employer, it certainly is not the laborer's fault, for no one can decently support himself and family on less than the present ruling prices. If the farm is clear of all indebtedness and in fair condition, no doubt it will pay to hire help. No rule can be laid down to govern its advisability in all cases; everyone must be his own judge.

Through fear of doing too much for posterity we often cheat ourselves, or, in other words, do not advance our own interests as we should for fear that others, some time or other, may enter into our labors. This, to say the least, is taking an extremely selffish view of the matter, and had our forefathers been actuated by the same principle we should not to-day be enjoying the advantages we have derived from their labors. We cannot isolate ourselves from each other and enjoy the benefits which accrue from a union of labor. Notably is this the case in the setting out of fruit and shade trees. We not infrequently allow ourselves to be reasoned into the belief that we will never live to reap the benefit of our labor and expense, and that it is unnecessary to do for posterity what they in after years can do for themselves, and thus the duty is allowed to go by. The fact is, however, that we reason falsely. In most cases the subject comes up for consideration in youth or middle age, and if acted upon we may and do in most instances live to see them come to maturity. Even if advanced in years we should by that time have learned a lesson which searches out beyond self. Twelve years, under favorable conditions, will bring an orchard into good bearing condition, and twenty years, at the outside, will produce maple trees large enough annually to tap, and at the same time afford a most luxuriant shade. The state has wisely recognized this fact in the matter of shade trees, and offers every necessary inducement to farmers and others to set them out along our highways. They are at once a thing of beauty and of profit, and the sooner we realize this two-fold benefit, the more anxious will we be to do our share in this commendable work. It is gratifying, however, to observe that the practice is yearly becoming more adopted, and ere long will become general throughout the state.

The relative position of capital and labor is one in which those engaged in agricultural pursuits are deeply interested, for they are the main factors in the latter, the producers of the former. Labor is capital, but capital is not labor; it is only the product of the former and can never take its place. The coffers of a people might be full to overflowing and yet they starve for the want of the necessaries of life unless a large percentage of its population were engaged in their production. No amount of wealth would ever construct our public works or private residences, if labor was not brought into requisition. When it ceases, capital loses its prestige and fails to benefit the world. Without labor the merchant might stand behind his counter until his goods rotted on the shelf, and he became a fair specimen of an Egyptian mummy, were it not being utilized to supply the means to purchase the necessaries of life.

We are in the habit of speaking of material waste, particularly as it affects the farmer in pursuing his avocation. Whatever has existed since the dawn of creation exists to-day, though in a measure in a modified condition. There may be, and undoubtedly is, under certain conditions, much individual waste to be guarded against; but there can be no general wastage—what one loses another gains—it is reactive and beyond control. The so-called waste, attributed to the negligence of our forefathers, is now productive of some of our most fertile islands and bottom lands from which we reap a rich reward; while those who come after us will experience the same results by what apparently is our loss. If we are not too liberal in our gifts to nature no harm will eventuate. When the bed of the ocean, lake or river becomes super-charged with debris from the land, it possesses the power of throwing off this surplus of extraneous matter. Thus the benefits of a munificent Creator are equalized and eventually assume a normal condition. The word annihilation, from which has sprung the idea alluded to, should be blotted out from our vocabulary, for it has no meaning. I do not know how it got there or why it remains there, unless it is a device of the devil to lead us astray, as it certainly does. God never created anything that diminishes in bulk or deteriorates in value and ever serves a wise and beneficent purpose, whether we realize it or not. He who, metaphorically speaking, holds the waters of the great deep in the hollow of His hand and has numbered the sands upon its shore, will never allow one drop of the former to evaporate or one of the latter to decrease in number, and when we shall cease to march with the tramp of time and one by one fall out of line, our bodies will be utilized for some good purpose.

Good cheer and mutual sympathy should prevail in the home of every family, for the inner life devoid of these essentials to true happiness is no shelter from a tempestuous world of disappointment and trial. The home of the farmer, more than any other, can be made to partake of these elements, and if they had been fostered to the extent permissible under the circumstances, I surmise that families would have been more united in their efforts to retain the homes of their fathers. But gradually a distaste for their avocation has manifested itself among some of their descendants who have sought the first opportunity to free themselves from it, and thus deprived of the services of those who are, or should be, interested in maintaining the home, parents are left alone in their declining years to fight life's battle alone; or, if help must be had, to seek it outside of the family. It is wisdom to retain the farm as long as practicable and as much as possible the children upon them, and thus hand them down from generation to generation to the end that they may be happy and prosperous by being engaged in the noblest of all occupations—that of tilling the soil.

Better than a marble shaft to perpetuate our memory is a busy and useful life, where creations link the past with the future, for he who by untiring industry helps to feed and clothe his fellowman is doing more to lay deep and broad the foundation for coming generations than the king upon his throne or the ruler of a nation. Although we may not be able to leave an impression upon the field of science, literature or art, we may upon the soil, the more lasting of all, for nature is never forgetful of her patrons.

The influence of farmers' institutes, now so successfully organized throughout the State, is manifest in every direction in which the farmer is interested. New methods of culture have been very generally adopted by those possessing the means to introduce them; while many improvements of a general nature, suggested by the experience of those who have tested their convenience and utility, have taken place in the home and out-buildings of not only the agricultural but other classes of citizens. Farmers should take advantage of these opportunities so generously afforded them by the State. Those who conduct these institutes are all men of superior intelligence in their respective line of thought, and merit the confidence of those who are privileged to listen to their instructive addresses.

The year 1899 was a more than usually prosperous one for those engaged in agriculture. Cereals of all kinds, except buckwheat, were more than an average crop; potatoes, planted on high ground, were an unusually good yield, while those raised on low land rotted to some extent. The apple crop in this section was large, but not of as fine quality as that of most preceding years. The crop of small fruits was large and of good quality, and met with a home market at remunerative prices. Indeed, there is more profit derived from this source than that of any other, when the labor expended in their production is properly estimated. The present season will be productive of a still larger crop, as many others not heretofore engaged in the business are turning their attention in that direction. The grass crop was fairly good, and the open weather experienced late in the fall has left quite a surplus on hand to add to the coming harvest.

The twenty-fourth annual agricultural fair was held at Monticello, August 29, 30, 31 and September 1, 1899. The number of exhibitors was 140, and entries as follow: Horses, 77; cattle, 212; sheep, 31; swine, 25; poultry, 347; vegetables, 326; potatoes, 403; grain and seeds, 154; dairy and culinary, 139; fruit, 227; flowers, 138; implements, etc., 11—total, 2,090.

Ladies' department: Domestic, 103; fancy, 232; art, 61; children's, 18; discretionary, 83—2,079.

At a meeting of the society, held December 21, 1899, the old officers were re-elected as follow: President, P. R. Polton, Avon; vice-president, W. J. Kinne, Maplewood; secretary, Roscoe Decker, Monticello; treasurer, S. L. Strong, Monticello. E. L. Sleath and M. C. Stewart were elected directors for three years, and George Knoll for two years. P. R. Pelton is corresponding secretary.

On the 12th of December, 1899, the twenty-fifth anniversary of the " Old Farmers' Club " was celebrated at the residence of Irwin Mapes, in Monticello. It originally consisted of forty-four members, twenty-one of whom have subsequently died. On this occasion John D. Buchanan of Liberty Falls, gave a brief history of its organization, growth and ultimate consolidation with the agricultural society as it now exists.

The town of Thompson has a Farm, Garden and Fruit Club, which meets every two weeks at the home of one of its members. Every branch pertaining to farming is here discussed and new methods brought to notice. But the most interesting and profitable feature of these gatherings is derived from the question box. It brings to notice many things which of themselves are generally considered of minor importance, but in the aggregate form a constituent part in farm labor. These clubs should be more general throughout the State than they are, and undoubtedly will become so when their value is better understood.

The following are the officers-elect: President, Leon Stratton; vice-president, Mrs. George Conrad; secretary, B. M. Lindsley; treasurer, Mrs. R. H. Hall.

A club was organized in the town of Liberty in 1872, with B. W. Gregory as president; F. P. Currier, vice-president, and M. B. Hall, secretary. In 1891 it was reorganized as now existing, with B. W. Gregory as president; W. H. Nichols, vice-president; J. O.

Newkirk, secretary; John Chaffee, treasurer. The by-laws of the club limit the membership to twenty members and their families (private families, as a rule, not being able to accommodate more), and meets monthly, except in July and August, at the home of one of its members. The discussions include agriculture, horticulture and floriculture. Music is rendered and refreshments served.

The Irrigation Schemes of the West.

By Gilbert M. Tucker, Editor of the Country Gentleman, read before the New York State Farmers' Congress at Albany, N. Y.

When a dog is about to lie for a nap, you will notice that he is very apt first to go through a perfectly useless and seemingly unmeaning performance hardly in character with his wonderful sagacity which so closely approximates the intelligence of man. He turns round and round two or three times in a little circle, his head about touching his tail. Why does he do it? Simply because his savage ancestors, thousands of years ago, living in forests undergrown with brush and weeds, noticed that they were more comfortable in their hours of repose if they first constructed in this manner a rough nest or bed. The turning round was to level the plant growth and smooth it down into a sort of mattress. What was at first a perfectly reasonable and commendable procedure, taken under the guidance of something very closely resembling intelligent thought, came in time to be instinctive—that is to say, it was and is performed under an unthinking impulse; and the instinct became ultimately so fixed in the race, so runs in the doggish blood, one may say, that it dominates the actions of the remote descendants of those early canine creatures to-day. The dog continues to perform, without necessity, sense or purpose, on a soft carpet or a smooth wooden floor, the operation which his far away ancestors performed, with very good reason, in the rank undergrowth of their native forests. The practice goes right on, centuries after changing circumstances have utterly destroyed its original value.

Similar occurrences of the persistence of superannuated practices are very frequent through the whole domain of animal life; and man is not exempt. Many ideas and beliefs, once sound, continue to influence human life long after they have entirely lost all application and fitness to a later environment, and have therefore become at least useless, in many cases positively detrimental to prosperity. Such ideas and beliefs, inherited from past generations and still cherished, without reflection or consideration of altered circumstances, dictate to a lamentable extent the policy that governs in our time the management of the public domain, still the property of the people.

Time was, say a couple of centuries ago, or even not quite so far back as that, if you like, when every foot of extension of the civilized occupation of this country back into the wild interior, every increase in population not positively vicious, was in many ways a real and solid gain to the people of the American provinces. Occupying as our forefathers did but a narrow strip of land along the Atlantic coast, with only inchoate manufactures, very slow and uncertain communication between different sections, and agriculture not much more than adequate to provide for very modest living, the one thing that was wanted before all others was development of the nation. The father of a large family of stalwart sons and daughters was most distinctly a public benefactor. As the children moved westward, bringing into cultivation acre after acre of new soil, and thus supplying better and better the needs of a growing population and enlarging the material resources of the common stock, they were laying broad and deep the foundations of the future greatness of the nation, and every pioneer deserved a godspeed from all well wishers for mankind. If any central authority had at that period exercised effective control over the unoccupied lands that stretched off, seemingly without limit, to the west, it could not possibly have done a better thing for all concerned than to facilitate by every means within its power the taking up of these lands as fast as possible by anybody who could be induced to occupy and cultivate them. Pioneering and homesteading were philanthropic occupations of the very first order of necessity and merit.

But it must never be forgotten that the circumstances of the seventeenth century in this country were radically different from those that surround us at the dawn of the twentieth; and that many lines of public policy once eminently laudable have become obnoxious and dangerous as times change. When a baby weighs ten pounds, it has just one alternative before it—grow, or die; when in after years the ten pounds has become two hundred, the condition of affairs is changed; further increase is suggestive rather of dropsy than of growth. The behavior most suitable to the infant nation, just stretching its unformed limbs and not yet quite certain what sort of creature it will grow to be, becomes in the highest degree absurd and detrimental when maturity has been attained, and the former infant has reached the understanding and the enjoyment of the powers of manhood. Of this obvious fact, in its relation to a rational management of the public domain, sight has largely and most unfortunately been lost by the American people. We go on hurrahing for every increase that successive censuses show in our population, with very little consideration of the quality of the people that have been added—in our agricultural area, with very little consideration of its actual value to the nation—and above all, in our production of crops, without any consideration at all of the profit of growing them or the real financial condition of the men who are feeding half the world. We go on turning round and round like the dog, merely because our ancestors did so and we take it for granted that that must be the proper thing. To sum it all up in a nutshell: Time was when every enlargement of our agricultural area conduced to the general welfare; such enlargement does not conduce to the general welfare now—quite the reverse. All the same, we go on tranquilly permitting if not actively encouraging such enlargement, and felicitating ourselves on that which is really, though insidiously, bringing upon us a train of appalling evils.

Before endeavoring to indicate definitely what some of these evils are, and the ponderousness of the weight that they are throwing upon our financial prosperity, let me make a plain statement of the speed and energy with which the government is dissipating and worse than dissipating our priceless heritage of cultivable lands, the property of the nation at large, and transforming what ought to be a blessing into a veritable curse.

According to the reports of the General Land Office down to July 1, 1899, the latest available, the average rate of alienation of our public lands for the decade last preceding that date was nearly 11,500,000 acres per annum, which is approximately 1,000,000 acres per month, over 31,000 acres per day, about 1,300 acres per hour, more than 21 acres per minute, or say one acre every three seconds, day and night, Sundays and holidays all included. Let us try to picture to ourselves what these figures mean. They mean that more than 17,000 square miles, an area considerably larger than one-third of the State of New York, is given away, practically given away, every year of our lives; nearly 1,500 square miles, considerably more than the State of Rhode Island, every month that passes; more than two square miles every hour. Imagine yourselves standing at the boundary, if there were such a boundary, between the land now the property of individuals and that which still belongs to the nation at large, and seeing that boundary moving before your eyes into the government possessions at such a rate of speed that the latter were steadily shrinking, hour after hour, day after day, year after year, at the rate of 21 acres per minute! Such is the rapidity with which we are energetically squandering our most inestimable possession. Our property burns our pocket, as they say of a spendthrift's money, and it seems that we shall never rest easy until we have dissipated the whole.

Now, of course, you will say at once: "Well, well, but we are not giving the land away; the national treasury gets something for it; and besides, we are developing the country. What in the name of common sense is land good for, arable land, if not for civilized man to cultivate? We are giving homes to the homeless of all the world. There is no grander chapter in the history of mankind than the filling up of our great western territory with industrious, intelligent, free and happy people."

Let us consider these points.

The return that the government receives from the average of all its agricultural land parted with, year after year, comes to so little more than enough to pay for the actual expenses of marketing it, that this return may be left out of the question. And then, it must be borne in mind that with the rapid increase of population in this and other countries and the consequent constant increase in the demand for food, it is perfectly certain that these wild lands of ours will be worth very much more, will actually command a much higher value in cash, if held and sold only on business principles, during the time of each successive generation than during the time of that which last preceded it. We are forcing upon a market already fearfully oversupplied the property for which the future is positively certain to bring a vastly increased demand at vastly higher prices than can now be secured for it. For all practical purposes, the lands are given away.

But we are furnishing homes to the homeless, and developing the country! A great many birds have been caught with that chaff. A farm is primarily a factory, only incidentally—and accidentally—a home; keep that distinction very clearly and sharply in mind, I pray you. Of course the owner may live on the premises; so may the owner of a cotton mill. But in every respect in which the occupancy of new farms at the far west affects the interests of the present owners of the property out of which they are carved, the people of the United States, each new farm is to be considered entirely as a new factory, entering directly into competition with those now established.

And as to developing the country: The long life of the passion for accomplishing that very indefinite feat is a straight case of the dog's turning round before he lies down because his ancestors discovered that the practice, under the circumstances then surrounding them, conduced to their well being. A century ago, no doubt, the country needed development; but, great heavens! what is the haste to develop it further just now? Are we not numerous enough, strong enough, as a people? Could any nation on earth dream of invading our territory? What in the world are we gaining, what can we possibly gain, by this frantic, breathless haste to develop, to fill up our whole country with people, any and every kind of people, foreigners very largely, the offscourings of the earth in no small part? Whoever has leaned on the forward rail of a westbound Atlantic steamer and watched for a while the immigrants on the steerage deck below, as I have done many times, must pray earnestly for the day when America shall most definitely go out of the business of offering an asylum to the downtrodden of every clime. What does it profit us? For my own part, I think the development, the filling up, is going on far too rapidly to be a healthy process; and I am very sure that the not inconsiderable fraction that comes to us yearly from abroad is something that we could very, very well manage to dispense with.

And now for what is after all the one main point of practical interest. How are we injured—we, the farmers of the Eastern States, and the classes that depend directly upon the farmers of the Eastern States for prosperity—in what way, definitely and exactly, are we injured by the liberality of the government in giving away its wild lands, our wild lands, as fast as possible, to anybody and everybody that will take them?

In the first place, of course one thinks naturally of the competition of the products of the new farms, in the markets of the world. I am inclined myself to the opinion that the injury in this direction is rather less than might be supposed, and that it is in fact very far from being the darkest element of the problem. The growth of population must of itself take care of the increased production, in part. The new farmers need an infinity of things that they cannot possibly produce. That helps manufactures; manufactures require workmen; workmen must eat; and thus the established farmers of the older regions will find a certain increase in the demand for their products, making up, *in part*, for the new supply thrown upon the market by their increasing competitors. And then again, the price of breadstuffs is very largely governed by the yield of crops abroad and the occurrences of every kind that take place in foreign countries. Wheat *may* bring a high price, though the American crop be immense; it *may* go begging, though our fields yield the scantiest return. Still, of course, it is patent that on the whole every new State in an agricultural region will for a long time export a considerable surplus of foodstuffs of some sort, and thus act distinctly, to a certain extent, in bearing down the market price. Most assuredly, after making all allowances, the competition of the new regions in selling just what we want to sell, is a danger and an injury that must be taken into the account. But that is only the beginning.

A second channel of mischief is the absorption by the free lands of the men and women who ought to supply, and in the normal condition of things would supply, an abundance of labor, at moderate wages, for established farmers. The demand for trustworthy farm help, at prices that farmers can afford to pay, is left largely unsatisfied—to the injury of the farming interest, and perhaps most of all to the overburdening of the wife of the small farmer with tasks of which hired servants should greatly relieve her—by the facility with which the persons who ought to supply it can go west and become farmers on their own account, your property and mine being freely offered them for that purpose. Why should anybody work for you, except perhaps at extravagant compensation, when the government is willing and anxious to make him a landed proprietor himself, without money and without price?

Nor is it farm *labor* alone that is drawn away from its natural homes by the recklessness of Uncle Sam in giving everybody a farm. A class of people better off financially go west also and take their money with them, the class among whom the farmer looks for tenants if he wishes to let his property, for purchasers if he wishes to sell. Why should a man of some means hire your farm or buy it, if he can get one of his own for nothing, grow up with the country, and presently land in Congress and go to making laws for you and the rest of us?

Now notice, please, how these three wrongs converge to drain the very lifeblood of the established farmer who has bought his farm and paid for it, or (still worse) owes something on it. The value of his crops is reduced by unfair and illegitimate competition; the supply of labor that he needs is minimized and therefore its price enhanced; and the class among whom he ought to be able to find tenants or purchasers is immensely restricted. The same malign influences act, of course, on all his brother farmers. Their profits, like his, are immensely diminished, and many of them, like him, are offering their farms to anybody who will pay a good rent or buy at a reasonable value. Thus an unnatural and intensely pernicious competition is set up—set up by our own government, mind you, for which we pay—between farmers of the older States, for the disposal of their property. So, of course, the value shrinks; the farmer falls out of the rank in the social scale that he ought to hold, because his property has so little money value; for, say what you will, a man's standing in society is regulated very largely by his supposed financial means. And if he wants to borrow money on his farm, he finds not only that it will be valued far below what would be normally a reasonable sum, but also that lenders are rather loth to advance money on farm security at all, because the sale of such property is slow and uncertain.

It is maddening to think of. The American farmer ought to be the most independent being on earth, and one of the most envied. Of all property in this country, a farm ought to be the most desired and the quickest in demand. There should be a dozen would-be purchasers or tenants bidding against each other for every farm that there is supposed to be a chance to get. Farm mortgages should be the most sought for of all investments, and the interest should be reduced, by competition of lenders, to about half of what now has to be paid, while the amount that can easily be borrowed should be about twice what it is now. It is all very well to blame the farmers of the older States for bad management when they fail to make money, and hoot at the idea that "farming don't pay." The marvel is that it pays as well as it does; the glory of the eastern farmer is that he can make headway at all, with this horrible burden on his back.

Now consider the equities of the case. This is no sort of a sectional plea, no setting up of one part of the country or one class of our people as entitled to any kind of special favor from the government or special protection from competition. Not a bit of it; nothing like it. The simple fact is just this: The public lands belong to the people at large, and it is distinctly opposed to the interest of the people at large that any more of them should be brought into cultivation, because our great basal industry, the industry on which all other American industries depend, is agriculture, and agriculture is depressed, its profits reduced, by every increase of our cultivated area.

Finally, what is to be done about it? It is too late now to hope for repeal of the homestead laws and similar out-of-date legislation in time to do much good. Ten years ago next October, when the journal with which I have the honor of being connected began the first regular attack that has ever been made on our outgrown and now suicidal national policy of dealing with the public domain, a very large area of arable land was still the property of the nation, and the work of giving it away, to the unspeakable injury of the owners, might well have been arrested. But I am sorry to say that it was then, as it very largely still is, quite impossible to rouse the class most directly interested, the farmers of the older States, to any sort of energetic action for the protection of their own well-being. Farmers' organizations, as a rule, have devoted themselves to all sorts of rainbow chasing, or have frittered away their energies on matters deserving enough, perhaps, but of very trifling consequence in comparison with the immense importance of attacking the one great evil. Very few individual farmers could be induced to call up the matter in granges or similar bodies, or even to interview their own representatives in Congress and urge them to action. Considerably more than a hundred millions of acres—just think of it, a hundred millions of acres—have been given away since then, with hardly an audible protest from the class who were daily robbed and impoverished by the operation, until now it is almost within bounds to say that there hardly remains a desirable homestead in any State washed by the Mississippi or its affluents; and they are scarce anywhere. As the last Year Book of the Department of Agriculture says, "all the best parts of the public domain have been appropriated, and comparatively very little good agricultural land remains open to settlement." One might think we were within sight of the beginning of the end of the mischief, and might hope now for a slow improvement, the supply of wild land being nearly exhausted, while our population is increasing by leaps and bounds.

Lay not that flattering unction to your soul. We are merely entering upon a second stage in the work of spoliation. Animated by an intensely selfish and narrow desire for the so-called development of their own States and Territories at the expense of the great body of the nation, the people of the far west are raising in increasing volume, year by year, a demand for the irrigation of the immense area of arid lands now the property of the United States, that at least a hundred million acres more may be brought into the market to compete with your property and postpone to the indefinite future the time when the possessor of a good farm shall be, as he ought to be, an object of general envy. The demand for this outrageous robbery of the people takes two forms. The plot at first was to induce Congress to irrigate this vast area at the national expense—at your cost and mine—that it might be rendered attractive to new competitors in our own industry and divided among them. This scheme of open robbery, however, was a little too barefaced to be very dangerous. Nobody could help seeing that it was just like asking Congress to build factories and give them to any impecunious but enterprising applicant that came along—imagine what our manufacturers now in business would say to that! This plan therefore is not, just at present, pressed very actively, though still rearing its horrid front, in some form, during every session.

But another scheme has been devised, to which it is hoped there will be less objection. It is simply for the national government to give, give out and out, all our arid lands to the States and Territories in which they happen to lie, in order that the local authorities may do the irrigating themselves. Just think of it. These lands are the property of all the people, just as much the property of the farmer in the northeast corner of Maine or at the extremity of the Florida peninsula, as of the people who live around them; five-sixths of all our population are east of the Mississippi and Missouri; and yet it is seriously proposed—yes, vehemently urged—that their ownership in the lands referred to be taken from them by force and given to the handful of people in the newer regions, these people themselves being chiefly the beneficiaries of the previous injustice of the government under that miserable old homestead law, that the property may be used directly and actively to the injury of the present owners. It is difficult to speak with patience of a proposed iniquity like that. If some of our Montana friends who are doing their best to bring it about were owners of valuable lots in Boston, which they preferred to keep vacant until a growing demand should bring an increase in their selling value, and the Bostonians living round these lots should endeavor to seize them, under color of developing Boston and providing homes for the homeless, one can imagine the indignation of the owners and the opinion they would express of the conscienceless rapacity of the plotters. The shoe is on the other foot; it is not their ox that is gored; and the plotting and scheming goes bravely on.

This brings us directly to the answer to the question—no matter about the past; what is now to be done? Just exactly this. Let every man of you resolve to exert himself in all proper ways (and there are many) to kill every bill that comes before this present session of Congress and every future session for the irrigation under any pretense of the arid lands, or for the giving of them away to the States in which they lie. You can accomplish infinitely more than you perhaps suppose, if you will use your power. The editorial pages of the *Country Gentleman* will keep you constantly informed of every one of these miserable bills as it comes up, giving definitely the number on the calendar, the name of the introducer, and the committee to which it is referred. Let every man who hears me sit down then, immediately, and write a personal letter to his Senators or to his Representative, according as the bill makes its appearance in the Senate or in the House, and also to the chairman of the committee having it under consideration, invoking his active opposition. Let him ask all his neighbors to do the same. Let him see that his grange, or any sort of agricultural union with which he may be affiliated, adopts ringing resolutions of protest, and that the secretary sends copies to the Representative and the Senators. God helps those who help themselves. If the farmers of the East permit the far-western schemers to pursue their course of determined spoliation, enriching themselves, indirectly perhaps, but not the less really, at your expense and mine, the farmers of the East must expect conditions increasingly unfavorable, year after year, decade after decade, for themselves and for their children; must expect that increasingly severe and unintermitted toil will yield increasingly meagre returns; and must expect themselves to descend gradually but steadily in the social scale till there shall be none so poor to do them reverence. In time, no doubt, a century or two perhaps, conditions must change again, as our increasing population makes larger and larger demands for food, while the supply of land on which it can be raised becomes proportionally smaller. But there is no earthly need to postpone the beginning of this recovery to an indefinite epoch in the uncertain future. Let the farmers of the East put forth but a mere fraction of the power which they most properly hold, if they would only use it, over our national legislation, to stop this tremendous and tremendously cruel and unjust competition by the beneficiaries of our own government, and especially to strike at this hydra of an irrigation scheme in all its phases whenever it appears, and the possible prosperity of the vague future may be realized within our own time, in a solid financial return for that form of labor which most deserves the triple boon of a bright and hopeful youth, a contented mind at maturity, and a competence with honor in declining years. Not, of course, that any legislation, or the absence of any legislation, can of itself make all farmers prosperous, any more than any legislation, or the absence of any legislation, can of itself make all men honest and prevent cheating. But although legislation is often impotent for good, it is always, if unwise or unjust, almost omnipotent for evil; and at the present time unwise and unjust legislation creates the one only cloud in the otherwise bright sky of American husbandry. To prevent the enactment of unwise and unjust laws, having for their sole purpose the enrichment of a comparatively restricted section of the country at the expense of all the rest—this is the one paramount duty of the hour.

The Man With the Hoe.

James Hilton, New Scotland, N. Y.

Thirty-five years ago a French painter living in the little village of Barbizon, near Paris, painted a small picture of a weary peasant man, with bent back, heavy, hopeless face and work-worn hands resting upon his hoe. This canvas, together with "The Angelus"—probably the best-known work of this artist in America—was hawked about Paris and finally sold to a small tradesman for an insignificant sum. After the death of Jean Francois Millet, France awakened to the fact that he had been the truest delineator of peasant life the world had ever known. His pictures were sold and resold for fabulous sums, and after many years the "Man with the Hoe" crossed the ocean to America, the property of a wealthy Californian—(Mr. Crocker)—who paid for it $60,000. People who saw the little picture, dimly felt its pathos, but it remained for an American gentleman—Prof. Edwin Markham—to interpret the picture in a great poem, which will live as long as literature endures. He has himself told us that when he first saw the "Man with the Hoe" at a loan exhibition in San Francisco, he stood before it an hour, absorbed and enthralled by the sight of this sad shape, which to him seemed not to portray a chance peasant, a mere man of the fields, a figure Millet had chosen to paint simply because of its artistic possibilities, but to express betrayed humanity—the Toiler, ground down to the level of the brute through ages of oppression and social injustice. He saw in it the working man pushed to the wall by monopoly and greed, until he had become a mere serf, with no mind in his muscles and no heart in his handiwork. He saw in it the slow, sure, awful degredation of man, through endless, hopeless, joyless labor. This pathetic figure seemed to him the very type of industrial oppression; a being with no outlet to his life, and no uplift. As he gazed, his heart thrilled with pity and terror over this pitiful example of humanity that had fallen down, and he resolved then and there to speak a word for the humbled, the burdened, the silenced of earth. You who are familiar with the poem know with what power he fulfilled his purpose. It is a terrible arraignment of the men who are the " masters, lords and rulers " of the world, who have failed to be fair to their brother of the furrow.

Millet, who stamped his genius on the little canvas, was of peasant parentage, having worked with his father in the fields of France until he was 18. No one knew better than he the human ruin which may be wrought by years of overwork and under pay.

Markham, the poet, was a working man also—a " hoe man " indeed—all through his boyhood and early manhood. He tells us that " the smack of the soil and whirr of the forge " are in his blood.

His poem is not a protest against labor, but the degradation of labor, the terrible oppression of man by man. The author believes, as every sensible person must, that labor is a humanizing and regenerating power when wisely directed, and entered upon with zeal and enthusiasm. But he knows, also, that work may be so hard and the burdens so heavy as to deform the body and starve the mind. The constant companionship of poverty and fear saps the energies and destroys the power which makes us men.

Probably no poem in the last half century has so deeply stirred the hearts of thoughtful people as the one under discussion. Praise and criticism have been lavished upon it indiscriminately. Some superficial thinkers among our agricultural brethren have resented certain passages in the poem, and have rushed into print to tell the public they were neither " brother to the ox " or " slave of the wheel of labor!" This clearly proves that they have failed to grasp the deep meaning, the great purpose of this modern example of " holy writ." To me it is a clarion cry for justice! A mighty plea for the socially submerged, for the unfortunate many who are ground and bruised and broken on the wheel of life, that the few may have more than they need of food and shelter and life and light.

Critics have insisted that we have no peasant class in our young, rich, independent America; that the principles of our government and the spirit of our institutions forbid that we ever shall have. While disposed to accept the optimistic view of this question, I must, nevertheless, call attention to the fact that America has imported plenty of stock from which such a class may breed. A tour through the West will show that our prairies are already thoroughly planted with the seed of a European peasantry. Freedom and liberal education must be depended upon to leaven this lump. It would indeed be difficult to believe that our American farmer or farm laborer could ever degenerate into the poor creature of the picture and the poem. For myself, I regard life on a well-conditioned farm a wholesome discipline for mind and body. I do not believe it is generally felt to be a hardship even from the view-point of the "hired man." In New York State he certainly receives a fair share of the profits of the farm, and has none of the responsibility of management. The farmer has his troubles and grievances, but if called upon to name the class most deserving of pity, I would not look for it in the fields of agriculture, but turn to our brother of the mines—that underground world where human lives are worn away in brute ignorance of all that makes the glory and sweetness of life! Human beings living like the denizens of an ant-hill, without the ant's share in the benefits of his labor!

The French peasantry which the Barbizon painter portrayed so well, is not a recent growth, but the product of powerful causes and conditions, whch have been operating in France for more than two centuries. Demolius, the French sociological writer, tells us that the chief cause of the demoralization of agriculture in France is due to the desertion of this profession by large land-owners, and the abandonment of country for town life. There is no country in the world where agriculture is so forsaken and discredited as it is in France. This result may be looked for in any country where the people become estranged from rural life and regard living on a farm as the gloomiest exile. No one can doubt that the profession of agriculture is important and necessary to a successful social system. It should and must, therefore, demand skill and intelligence in its followers if we would save it from the demoralization and decay which is apparent in France.

The so-called commonest professions in our system—agriculture, industry and commerce—represent the most vital and essential part, because through these are procured the daily bread, upon which all other work depends. If these professions are made to suffer, the whole social body must suffer; if they decay, the social body must decay, as surely as the physical body decays if not properly nourished. If necessary we could probably live without lawyers, without journalists, without officials, even without physicians, but we could not live long without the farmers, who provide the food, nor without the manufacturers, who furnish the objects and implements of essential use; nor without the traders, who distribute indispensable goods to the places where the demand exists. It is good for us to realize sometimes that we are quite as important to the world as the world is to us. Agriculture is the most stable of all professions. It is not subject to sudden changes like industry and commerce. It presents a regular routine from sunrise to sunset. A farmer who permitted his cows to go unmilked would court disaster as surely as a manufacturer who would allow the machinery in his mills to run without attention or service. The man with the milk pail may not go down to posterity in a great picture, but he has his uses.

Some farmers have a great fear of competition. The very word somehow seems to express hard conditions—especially when it happens to affect us personally. Nevertheless, competition brings about some good results. It compels people to greater industry. It keeps things moving. Some one has said that man is as lazy as he dares to be, and one of the early fathers thought that laziness must be the "original sin," it is so common. Prof. Henderson says: "The tendency of competition is to starve out the feeble, the slow, the indolent, and to give the world and its soil to the healthy, the vigorous, the cunning, the inventive." If this be true, competition and kindred evils will eventually create a "Man with the Hoe" class in America. A system which serves to "starve out" any of our people should be abandoned. The altruistic plan is better; help the feeble, encourage the slow and indolent, rather than trample them in the dust to perish, as the race moves on to finer achievements.

The endowment of faculties is so unequal that the fortunes of men must be unequal also. Abraham Lincoln stated this principle very clearly when he said, "Property is desirable, is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise." It is the criminal misuse of wealth which irritates the public mind, yet there never was a time in the history of the world when the possessors of great wealth were doing so much for society and for the poor. Men are coming more and more to comprehend that their fortunes are held in trust; that wealth has been given them for the divine purpose of helping and making better the world in which we all must live. There is danger and menace in idleness, whether forced or voluntary.

It is natural for healthy men to like work, bodily exertion, strenuous struggle. Our college-bred young men must row a boat, play baseball or kick a football. If our field work could be done with the same spirit of zest and good cheer, it would go far to solve the labor problem for the farmer. Once there was a wise father who induced his young son to cut down a whole field of mullein and other noxious weeds by telling him they were hostile Indians to be exterminated. Imagination is a very good thing to cultivate—in moderation.

Industrial prosperity will not be permanently established until the wages, profits and perquisites of the agriculturist are large enough to tempt men voluntarily to adopt that profession; until the State and government shall reduce to a minimum its own prerogatives, thereby attracting young men to independent callings which demand individual effort and personal exertion; in brief, not until we have a social state in which the politician and the idle man shall receive less consideration than the farmer, the manufacturer and the trader.

It would be a great help to American agriculture if we could make rural life fashionable here as it is in England. When the English tradesman or manufacturer has made his fortune, he immediately seeks the country and becomes a landed proprietor. To possess a country place is a sure indication of prosperity and success. It frequently opens the social door to his family which otherwise they could never hope to enter. Our American farmer, and village merchant, take a different view. He and his family often spend their best years working and saving, in the hope of one day being able to reside in that mecca of their ambition—the city. If we must adopt English customs, in the name of all that is sensible and sweet and sane, let us cultivate the English love of rural life. To do this we must make our rural regions lovable and attractive. English roads, and walks, and hedgerows, cannot be made in a season, but not one of us is too poor or too busy to do something to improve our premises. Plant a tree where shade is needed; set a shrub in that ugly corner; trim out the undergrowth, and keep the grass cut. Lend a hand to help your wife or your mother with her flower-bed, and praise it, too! When I see a bright patch of flowers growing near a dull little farm-house, I feel like lifting my hat to the woman within. She may be poor and plain, but in her soul there lives a love of beauty, and color, and fragrance, to which I gladly do reverence. Everything which makes for happiness and contentment adds a note of music to the harmony of life.

The importance of keeping the women of our households cheerful and happy and healthy cannot be overestimated. If the daughter of the house goes away to school and absorbs something of art, music, literature or science, let her be generous in bestowing the riches of her attainments on the home circle, not in a way to irritate and embarrass, by reminding them of their own defects in education and opportunity, but with a heart-felt desire to give them happiness, and to apply her accomplishments to improving and beautifying the home. Many a hard-working, self-sacrificing mother, doing her homely tasks day by day, is soul-starved for sympathy and appreciation which her worldly minded daughter is too thoughtless to give. Make the mothers happy. If the counterpart of the "Man with the Hoe" exists in America, he is the outgrowth of industrial and agricultural misfortune. Hard, unremunerative labor may always be depended upon to breed discontent and degradation. If we would lessen the number of this class, we must cure conditions which kill and degrade a man, whether his sphere be the mine, the mill or the farm. We must encourage legitimate industries. We must establish agriculture as a permanent and self-respecting profession in which the wisest and strongest may engage with pleasure and profit. Agriculture that is conducted by weaklings will decay and degenerate. The hoe and the hammer, the pen and the paint-brush have each a part to play in the world's work; and it is my hope and belief that in the enlightened judgment of the future each will be accorded equal honor if wielded well.

The regeneration of the race must come through the energy and heroism of the plain people if it come at all. It will not come in any sudden, miraculous fashion, but must be the slow, sure growth of civic honesty and brotherly love. Let us all, then, pledge our best endeavors—

"To build with song again
The broken hopes of men;
To hush and heroize the world
Beneath the flag of Brotherhood unfurled."

State Agricultural Society.

By W. B. Tooley, Cornell University, Ithaca, N. Y.

ITS HISTORY BRIEFLY OUTLINED.

[Other brief sketches of the history of the New York State Agricultural Society may be found in the first volume of the transactions of the society, in the report of the U. S. Commissioner of Agriculture, 1875, and in volume II of Public Service of the State of New York, edited by Hon. Paul A. Chadbourne, D. D., LL. D. Also a history of the farmers' institute movement may be found in the volume of Transactions for 1895.]

Now, at the beginning of the Twentieth century and at the time of a great crisis in the history of the New York State Agricultural Society, is a fitting occasion to look back over its previous history and to note the influence it has exerted in improving the condition of the American farmer.

The present society has grown from the work of earlier organizations. In 1791, there was organized "at a meeting of a respectable number of citizens at the Senate Chamber in the city of New York" a "Society instituted in the State of New York for the promotion of Agriculture, Arts and Manufactures," and Chancellor Livingston was chosen president. The chief object contemplated by this Society as then organized was the publication of practical papers. May 1, 1804, the original charter expired. In the new charter, which was granted April 2d of that year, the name was changed to a "Society for the Promotion of Useful Arts in the State of New York." The Society was, however, practically unchanged, although it was intended that, besides the original object, namely, that of publishing practical papers, the organization should establish an experiment station and found a library. Neither of these objects, however, was effected. The four volumes of Transactions in which the above mentioned papers were published appeared in parts and at irregular intervals from 1792 to 1819, etc. The first and second volumes deal largely with Agricultural subjects, the third deals almost entirely with mechanics, while the fourth volume is miscellaneous in character. Among the contributors may be named Robert R. Livingston, Ezra L'Hommedieu, Samuel L. Mitchell and Simeon DeWitt. These men laid the foundation of a great work, but the society they founded was not destined to carry it further; for in 1824 it "lost its agricultural character and became merged in the Albany Institute."

In the meantime the agricultural interests of the State were transferred to another organization. April 7, 1819, the Legislature appropriated $10,000 per annum for two successive years to be awarded to farmers in premiums by the county agricultural societies which should raise an equal amount by voluntary subscription. The act further provided that each county society should choose one member to a board of agriculture which should annually publish a volume at the expense of the State "to be distributed to the good people." The board organized January 10, 1820; and, the annual appropriation being extended to six years, continued its work until April, 1825. Three volumes, similar in character to the Transactions of the former society were published in 1821, 1823 and 1826.

In February, 1832, eighty-seven "zealous and enlightened friends of agriculture" met at an "agricultural convention" in the capitol and organized the New York State Agricultural Society with LeRay deChaumont as president. April 26, 1832, seven years after the Board of Agriculture went out of existence, this new society was incorporated by act of the Legislature. The chief work of the society as then organized was the publication of agricultural essays, although at the second meeting, February, 1833, a memorial was presented to the Legislature asking that provision be made for an agricultural school, and a resolution was adopted that a fair be held in Albany and also in New York during the following autumn. Accordingly, on the second Thursday of October, 1833, the New York State Agricultural Society held at Albany its first and only fair until after its reorganization in 1841. This fair, it was said, "although the first, fully met public expectation." The agricultural essays referred to above, together with the proceedings of the society were published in the "Cultivator," a monthly journal founded by the society and circulated among the farmers at a nominal price. The first number appeared March, 1833, with Jesse Buel, J. P. Beekman, and J. D. Wasson as committee of publication. The Cultivator soon became the individual enterprise of Jesse Buel and shortly after his death was combined with the Genesee Farmer under the editorship of Willis Gaylord and Luther Tucker. In the pages of this journal were printed the foremost agricultural thought of the time, and many articles, especially those of advice to young farmers, are of great value even at the present day.

However lasting the influence of the society through the pages of the Cultivator may have been, for several years little else was done save the holding of annual meetings in Albany. Gradually the members became dissatisfied with these petty results, and the more progressive thinkers began to see that the society must start its work on a new basis. February 10, 1841, a reorganization was effected and the following suggestive clause inserted in the constitution: "The society shall hold an annual cattle show and fair." This movement owed its success to the indefatigable exertions of a few men, among whom may be mentioned Ezra P. Prentice, Luther Tucker, Benjamin P. Johnson, Joel B. Nott, Alexander Walsh and J. J. Viele. The success of their efforts was due, first, to an act of the Legislature appropriating the sum of $8,000 for the term of five years for the promotion of agriculture and household manufactures in the State. This amount was apportioned as equitably as might be among the county societies, and $700 was allowed the State Society. Another strong factor tending toward the success of this new movement was the annual fair made possible by the above appropriation.

These fairs, beginning at Syracuse, September 29 and 30, 1841, have been held every year since with almost invariable success. For almost fifty years it was held at various places throughout the State. In 1889, however, the society made provision for permanent grounds at Syracuse, and there the State fair has, beginning with 1890, since been held. These fairs, by enabling the farmer to hear the thoughts and see the products of the foremost agriculturists of his day, have had an educational value which has started many a man on the road to success.

The holding of fairs, however, has not been the only great work of the State Society. In its published Transactions are articles on almost every subject connected with agriculture, such as tillage, grasses, stock husbandry, horticulture, entomology, household arts and in the earlier days silk culture was given a prominent place. The first volume of the Transactions appeared in 1841. Thereafter the Transactions were published annually until and including the year 1871. Other volumes followed in 1876, 1882 and 1886. During the next three years three volumes were published in pamphlet form. Beginning with 1890 the proceedings of the society were published under the title of Annual Reports. Of these nine volumes have appeared. The later volumes have given quite extensive reports of contemporary agricultural and kindred societies in New York State, and since 1893 have been largely devoted to farmers' institute work.

Indeed this farmers' institute movement was started and for several years carried on by the State Agricultural Society, though now under the State Agricultural Department. Through the efforts of Professor I. P. Roberts of Cornell University and J. S. Woodward of New York a farmers' institute was held at Ithaca in January, 1886. This first attempt was so successful that the society set aside $1,050 from its funds to be used the following winter in inaugurating this movement. Accordingly during the winter of 1887, institutes were held at Lockport, Ithaca, Oswego, Batavia and Schenectady. The success of the movement exceeded the expectation of even the most optimistic among its supporters, and later results have given ample proof of its value to the New York farmer.

Beside the work already enumerated, the society has conducted extensive trials of agricultural implements and machinery. It appointed commissioners to enquire into the cause and treatment of contagious diseases, among which may be mentioned the contagious pleuro-pneumonia of 1859, the rinderpest of 1886, the plague of bovine abortion in 1867, and the epizoötic apatha of 1870. These were promptly taken in hand and valuable work done for the live stock interests of the country. Another matter of historic interest is the publication, 1850 to 1873, of a monthly journal in which appeared the work of the various committees, current events and other brief matters of agricultural interest. In mentioning the factors which have contributed to the success of the New York State Agricultural Society, the annual meeting in January must not be forgotten. Here the strongest men of our State have met together for a common purpose, namely, that of helping the farmer to a better condition in life. This is a noble work, and it has been nobly done.

At the present time it seems that this grand old organization is on the wane. The State Agricultural Department has little by little taken unto itself the work of the society until, to quote from a leading agricultural journal, " last year there was nothing left for the State Society but the management of the State fair." Difficulties of a financial nature, which need not be mentioned here, have also presented themselves. It is to be hoped that, these difficulties passed, new work will be found and the New York State Agricultural Society may again flourish as in days of old.

Farming on the Island of Jersey.

By F. S. Peer, Author of "Soiling, Ensilage and Stable Construction."

To say the peasant farmers on the Island of Jersey (many of whom can neither read nor write) are the best and most scientific farmers in the world, sounds like a contradictory statement, a very boastful one to say the least. I make the statement on my own account, for I have never heard it said of them nor do the islanders set up any such claim. They are quite unconscious of the fact themselves, as only a very small proportion have ever been away from home to the extent of crossing the channel that separates the island from France or England. I call them the best farmers in the world for the simple reason that they make their farms produce more per acre than any other farmers I ever saw or heard of. To grow large crops on land that has been under cultivation since long before "the morning stars sang together" may be called the art agriculture, and if, as Lockhardt says, the science of farming is to take large crops from the soil and leave the soil in better condition for the succeeding crop than it was before the crop was taken, then of all men the peasant farmers of the channel islands must be considered most scientific, for the fertility of their farms has steadily increased to meet the requirements of their increasing numbers and their increasing wants.

The little Island of Jersey is only fourteen miles long and four to seven miles wide, a good sized western farm. There is, however, a resident population of 55,000, and that this island is able to support its own inhabitants and feed 40,000 to 50,000 visitors annually, is something wonderful. When I tell you that in addition to this there is exported from the island yearly between three and four million dollars worth of farm and garden produce, no one will question that these island farmers deserve the distinction that I have given them.

Early potatoes and cattle are the principal farm products; the potato crop alone that was shipped from the island this year brought £445,872 or $2,175,855. There is on the island, all told, about 25,000 acres. There is of course a great deal of waste land along the coast so that there is only about 10,000 acres of land worked or tilled by farmers. There are 1,200 farmers and the average sized farm therefore is about eight and a half acres. On an eight-acre farm there will be, say four and a half to five acres of potatoes (followed by a crop of roots same season) an acre or acre and a half of grass, and on the balance of the farm, oats or meadow, garden and buildings. The farmers pay from forty to seventy-five dollars per acre annual rent, and 300 bushels of early (partially grown) potatoes is considered a good crop, while 400 bushels and even more is not uncommon. I am afraid to tell the truth as to the number of tons of mangolds that are produced per acre, after the potato crop, without additional fertilizers.

How is it possible to grow such crops on such a small piece of land, support such a large population and export over three million dollars worth of produce yearly, at the same time to increase the fertility of the soil so as to produce such crops? I reply by keeping a large number of live stock for the manufacture of barn-yard manure. Incredible as it may seem, on these 10,000 acres there are owned—according to the last census—11,891 Jerseys, 2,343 horses, or 14,234 head of stock, to say nothing of pigs and poultry. The farmers buy some commercial fertilizers and draw a great many tons of sea weeds gathered on the sands when the tide is out which they spread on their meadows and grass land, but their principal reliance is barn-yard and liquid manure. I doubt if there is a farm on the island without a liquid manure cistern, the contents of which is pumped into a hogshead, on a two-wheeled cart and distributed on the grass and meadows.

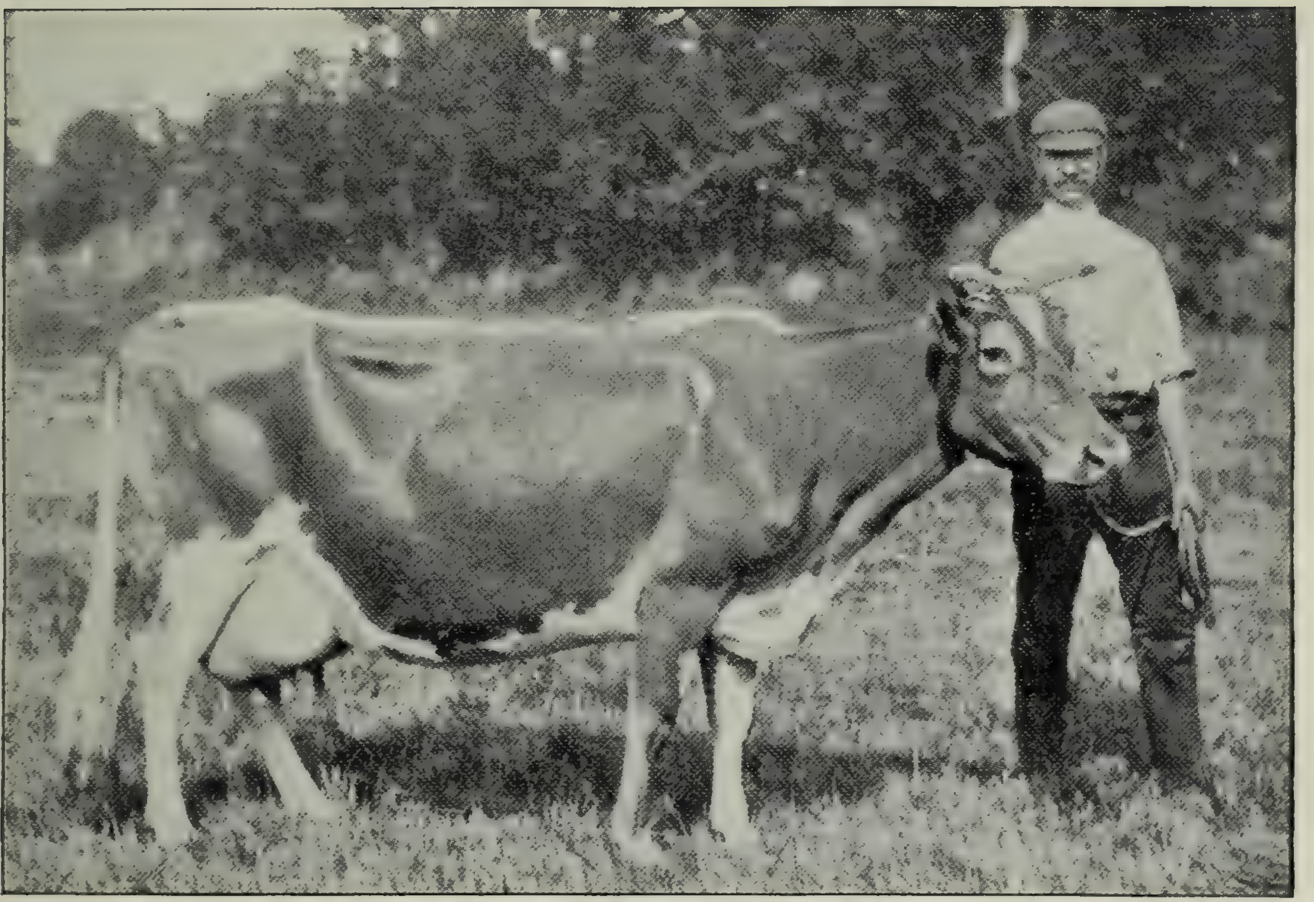
But how can they feed such a great number of cattle from so small an acreage of grass land, when potatoes and other crops occupy about two-thirds or three-quarters of the land, where 14,234 head of live stock is nearly an animal and a half per acre for every acre farmed? By adopting a strict soiling system only the milch cows are allowed to go to pasture; these are soiled or tethered out, beginning at one end of a field; each cow mows her own swath across it. She is moved on once or twice a day according to the size of the grass and makes a clean sweep of everything within reach of her leather rope, which is about twelve feet long. The growth of grass is something wonderful. The cattle feed across these fields six or eight times during the season, and even then portions of the field often gets the start of them and is cut for hay. All the young things are kept in the stables and fed on roots. Mangolds are also fed night and morning to the milch cows that are usually housed during the night. Roots are probably 75 to 80 per cent. of a cow's feed during her lifetime on the island. In the winter she gets in addition a little hay, possibly two pounds, night and morning. Not only are these islanders the best and most scientific farmers, but their system of selecting and breeding is also ahead of that of any other community. It has brought to that little island millions of dollars and is likely to continue to do so for generations to come. Nevertheless they are largely without books or education. I doubt if there are over a dozen copies of agricultural papers subscribed for by the farmers on the island. How can their great skill as farmers, breeders and gardeners be accounted for? Their methods in some respects are very primitive and have doubtless been handed down to them from the teachings of pious monks who were said to be very learned men and particularly fond of agriculture. They experimented and taught it to the young men and orphans who were brought under their influence. The ruins of several Dervish temples of great antiquity still remain as evidence of these priestly orders. While their pupils were kept purposely ignorant of all book learning they profited by the lessons of their learned teachers. This probably is the foundation of their agricultural training, but necessity has been the great teacher. How to feed their ever increasing numbers has been the problem, and this has been accomplished only by keeping the greatest number of cattle making the greatest amount of barnyard and liquid manure, which, as before stated, is made possible by adopting a strict soiling system.

Plowing.

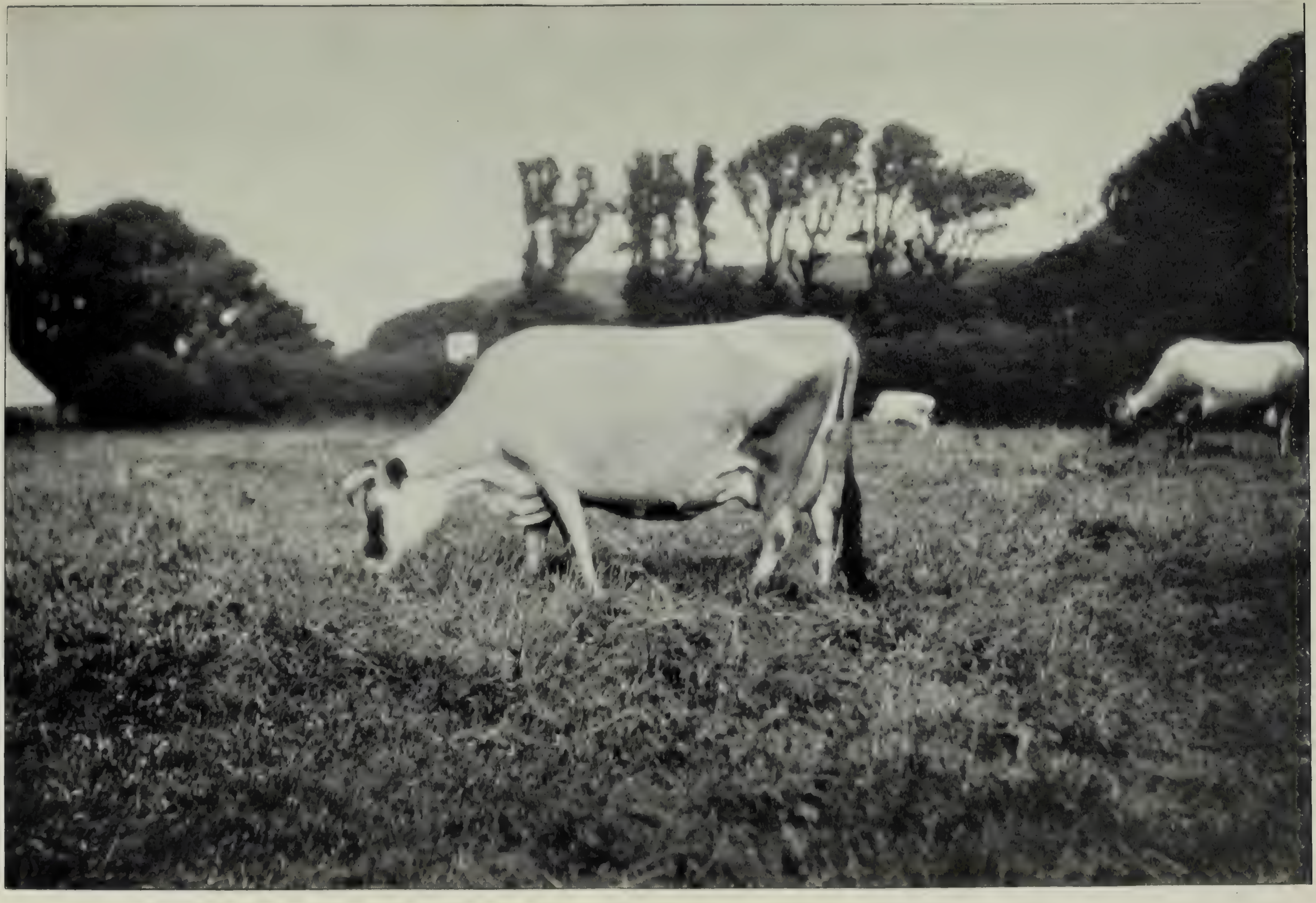
I have said the islanders were the most scientific farmers, yet if I could show you one of their plows, you would laugh. It is anything but a scientific implement, for instead of the long, graceful, easy lines of a modern light draft American plow, it is very large and heavy, with the mould board about as blunt as it is possible to make it. It takes six horses to draw one of these plows, but if it is not scientifically built it does most scientific work. While an American plow turns a furrow that is so easy and gradual that the ground is barely cracked in the turning, the islander's plow, pulverizes the ground thoroughly. The plowing season is the great event of the year, the farmers changing work, as no one man has horses enough to do the job properly. First they plow a furrow about four inches deep and fourteen inches wide with four horses; then a heavier plow follows in the same furrow with six, seven and sometimes eight horses attached. This plow goes eight to ten inches deeper and the same width as the lighter plow. The ground is so thoroughly pulverized that nothing more is done to it except that boys and men walk along the furrow and knock to pieces any lumps that work to the surface. The whole seed bed from top to bottom of the furrow (twelve to fourteen inches) is more like an ash heap than a plowed field; no harrowing is needed, not a foot touches it until the day for planting; in fact it would be almost impossible for a horse to travel across it.

Planting Potatoes.

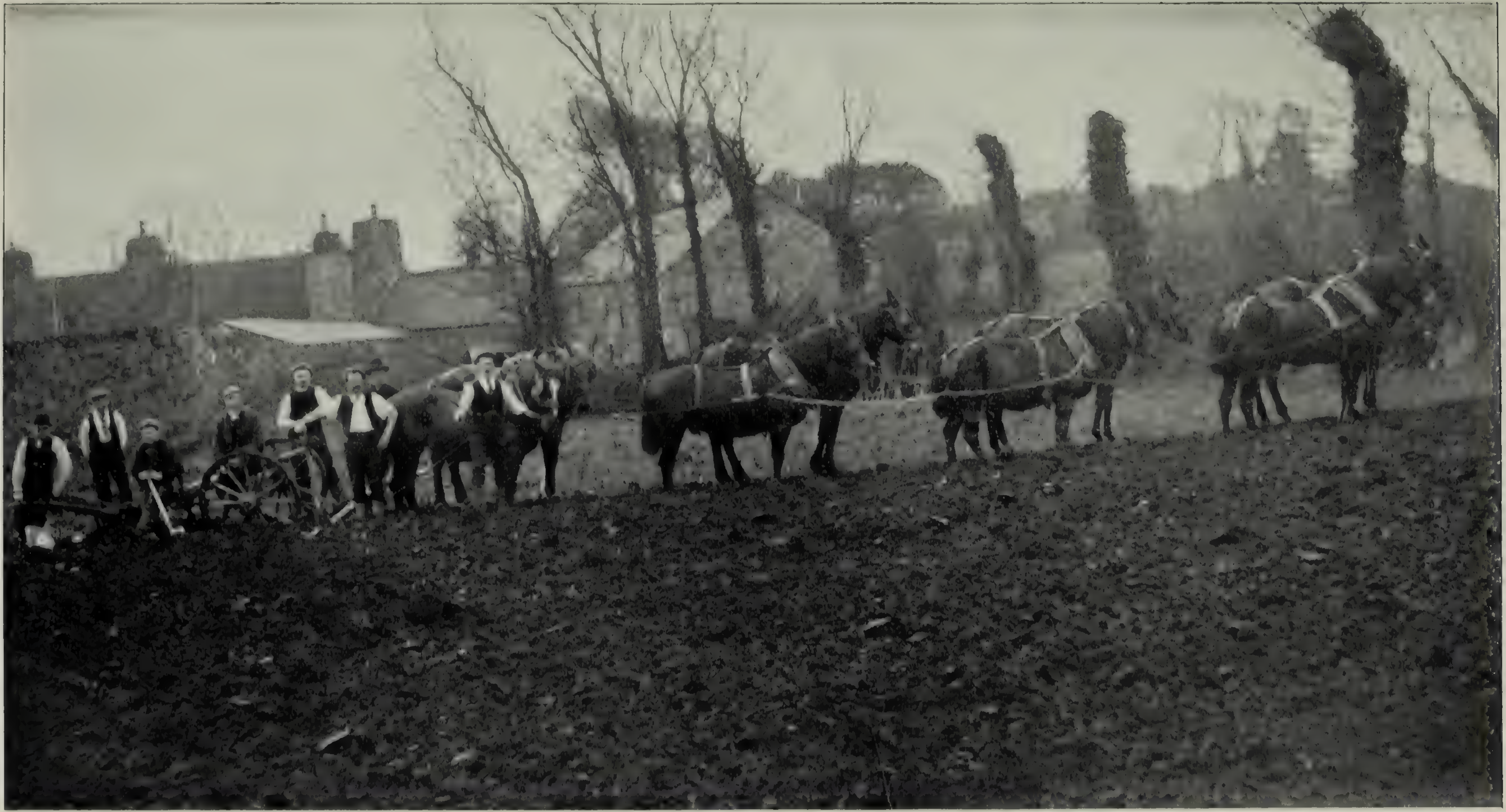
"The spuds," as they call the seed potatoes, are carefully lifted from the ground where they are left to ripen. Later they are sorted and set, with the eye-end up, in trays. These trays are corded away in some outbuilding adjoining the stables, and by spring there is one strong sprout an inch and a half or two inches long growing out of this eye end. These trays are carted to the field and the potatoes planted by hand, one at a time. First a line is stretched across the field and men with shovels throw out a trench, using the line as a guide. Women follow and dust a little commercial fertilizer along the trench; other women and boys come on with a tray of potatoes and set each one upright in the row. The trench is about four inches deep, so that the sprout on the potato is very near the top of the ground when covered.



Guernsey cow, Vrangue's Favorite IV 1923, P. S., R. G. A. S. Property of Alfred Le Patourel, La Ramee, Island of Guernsey.

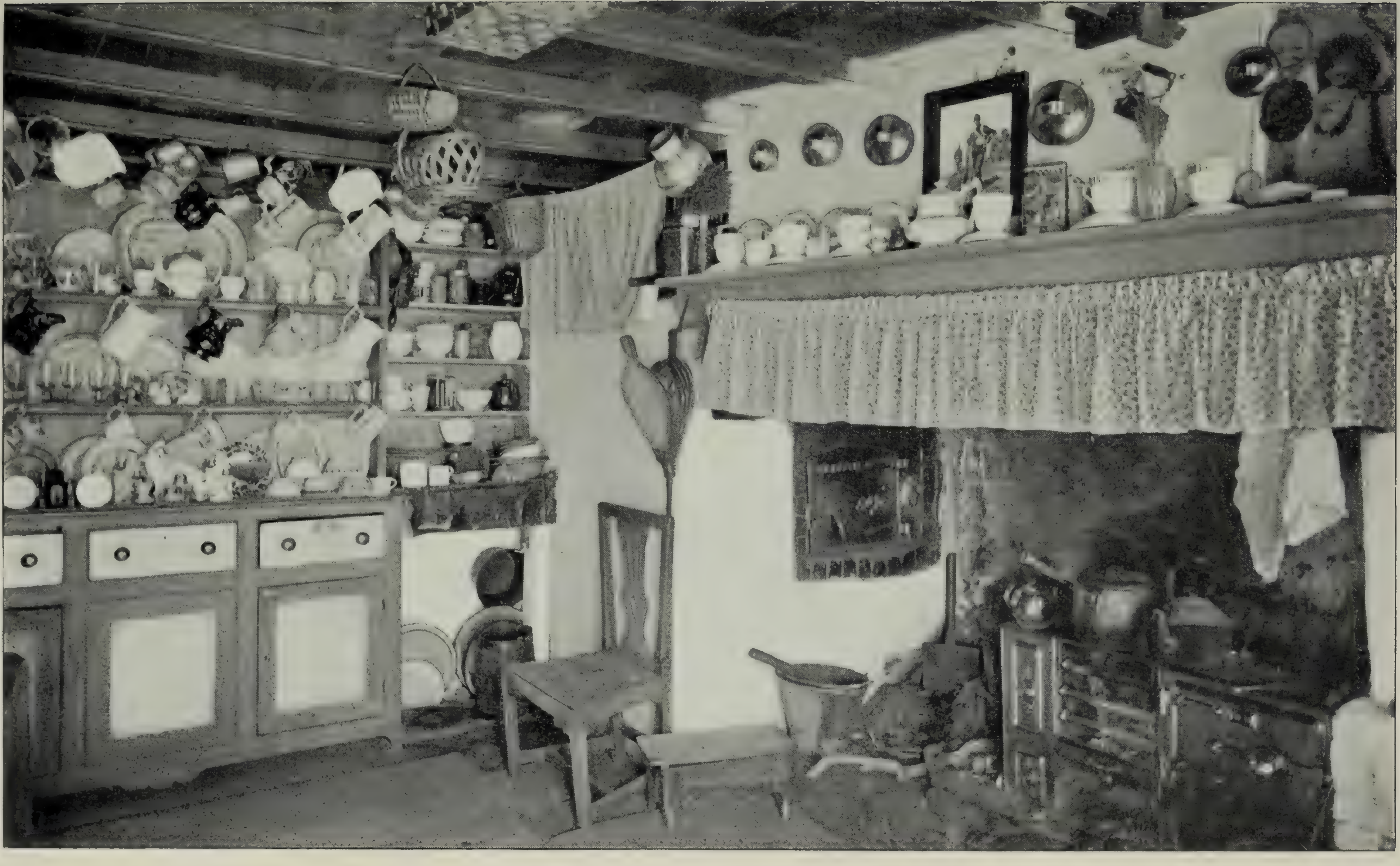


How the cattle are tethered.



Islanders ready to plow

A picturesque roadway, Island of Jersey.



An artistic corner in an Islander's home

This planted trench is filled by the ground taken from the next trench. The potatoes are always planted whole, five or six inches apart in the row, and rows ten to fourteen inches apart. In four or five days—if the weather is favorable—you can see a leaf breaking through the ground so that one can distinguish the rows. The cultivating is done mostly by hand, as the rows are too narrow to admit using a horse; however, some of the larger farmers plant so as to cultivate with horses. It is no uncommon sight to see a man and a woman or three women hitched tandem to a cultivator and at work in this way day after day.

When an American has spent a few weeks on the Island of Jersey and sees the enormous crops they take from the soil it makes him think that as farmers in America we hardly know our agricultural A, B, C's, and that with all our Agricultural College Experiment Stations, patented machinery, books and learning, we are way behind the times in knowing how to increase and maintain the fertility of our farms.· Is that saying too much? Let me call your attention to the fact that the average wheat and corn yield in America has steadily declined until it is only about thirteen bushels per acre.

What do we know about agriculture in America compared with these unlettered islanders? Nothing. Any fool can rob his farm of its fertility and live for a time off of the fatness of a virgin soil, but it takes a farmer, an agriculturist, to restore it, to increase it and to " farm it " so as to win it back to productiveness with ever increasing power.

I can not close this article without calling the reader's attention once more to the prime cause of the islanders' success, i. e.: The great number of cattle they keep, which means a great quantity of manure, which means great crops, all which is made possible by adopting the soiling system for their cattle. I may also add that there is no system or farm practice that will teach a person the art and science of agriculture in this country, as will the adoption of a strict soiling system for his cattle. First of all, it enables him to keep four or five head of stock on land where by pasturing he could support but one. This means that he is producing four or five times as much fertilizer (barnyard manure) in quantity as formerly and at least ten times as much when the quality is taken into account. This enables him to grow larger crops each year. Instead of spending half of his profits for commercial fertilizers, he manufactures his own. He sees, as he never saw before, the necessity of increasing the fertility of his farm. He discovers that the first essential to successful farming is to feed his growing crops liberally; not to see how little he can do for them, but how much. Instead of trying to get something from nothing he turns squarely about and the manufacture of barnyard and liquid manure absorbs his attention to an extent he never dreamed of before. There is nothing in the world like the adoption of a strict soiling system to teach any man, be he learned or ignorant, the true principles of agriculture, and it is to this one thing, i. e. "Soiling" (forced upon them by necessity) that makes the channel island farmers the best and most scientific agriculturists in the world.

The Ideal and Real in Life.

By Ella F. Flanders, DeWittville, N. Y.

Although this is a very practical world, and the tendencies of the men and women in it lean mainly toward the practical side; yet sentiment is not a rare thing, and ideals are as numerous as reals.

We are all castle builders. All in youth had a fairy ship at sea freighted with the brightest hopes and possibilities our youthful fancy could picture, but to none of us perhaps has come the realization of our fond day-dreams. Our castles may have crumbled into dust, and our ships, like the fairy phantom ship of old, may still hang in the horizon, never advancing toward us.

Our realizations have perhaps been very different from our anticipations, yet for all this, our high ideals have urged us to a higher plane of thought and action. Every result of importance must exist in the mind before it can exist in reality. The beautiful statue was an ideal hidden away in uncut marble until the sculptor's chisel set it free. The poet's masterpiece was but a floating dream until with patient art he brought it forth. Columbus reared a castle and started in search of it. It was only an aircastle when Morse pictured to himself the lightning, carrying news from place to place, but through his effort it became a reality. "Dreaming comes before labor, but labor alone makes it worthy." Youth is the period when we live most in the world of fancy and idealism. Henry W. Longfellow tells us

"Each man's chimney is his golden milestone,
Is the central point from which he measures every distance;
Through the gateway of the world around him
In his farthest wanderings still he sees it,
Hears the talking flame, the answering night wind as he heard them
When he sat with those who were but are not;
Happy he whom neither wealth nor fashion,
Nor the march of the encroaching city drives an exile
From the hearth of his ancestral homestead.
We may build more splendid habitations,
Fill our rooms with paintings and with sculptures,
But we cannot buy with gold
The old associations."

The wisest and best in all ages, too, unite in telling us that from our early homes emanate the most potent and far-reaching influences of life. We may wander far and wide, life may bring us the best of all she has to give—friends, influence and wealth—yet nothing interests us so much as the scenes and friends of childhood. If the child's mind be like wax, to receive impressions, it is also like adamant to retain them.

It is related concerning the eminent French writer, Victor Hugo, as he lay dying, and all France bent low to catch the whisper of his words that he spoke almost invariably in Spanish and of his happy boyhood days spent in Spain. As the light in his eyes grew dim, the gifted man dreamed only of his boyhood when he wandered care-free, and the world thinks of Hugo to-day, not at the pinacle of his power as one of the best writers of his time, but as a man loving above everything else, the memories of a happy childhood.

In the quiet and seclusion of home our children form their best ideals. How important then that these influences are the best; how important that the general line be one of the highest culture and refinement, that the moral and religious character be considered of the gravest import.

A few years ago I read that wonderful book, "The Greatest Thing in the World," by Prof. Henry Drummond. I was so absorbed in it that I read it not once, but twice. It has found its way into several foreign languages; and the thoughts on right living and the great universal law of love to all mankind are unsurpassed. It is a great thing to be able to live at our best, particularly in our homes.

In no profession perhaps is the difference between the ideal and the real more apparent than in that of farming. It is to many a pleasing ideal to picture themselves on a fine well-tilled farm, surrounded by fruitful orchards, well-kept gardens and fertile fields. But it is decidedly practical, in these times of close competition and scarcity of capable help, to the man whose brain must devise the best ways of tilling his soil, caring for his fruit, and rearing his stock so as to give to himself and family a fair and remunerative return for labor expended.

We sometimes hear the expression, "Farmers are ignorant." Concerning this a recent publication says: "Are they? Indeed!

In forms and fashions and artificialities they may be lacking, but in respect to good solid knowledge the successful practical farmer of to-day becomes a sort of encyclopedia. He is practically a "physiologist, a veterinarian, a botanist, an entomologist, even a chemist;" at the same time he is a mechanic, learning the care and use of machinery. Truly there is no class that needs or possesses such varied and practical knowledge as agriculturists. By many they are underestimated, but Longfellow very sagely says: "I do not pity the misery of a man underplaced, that will right itself presently; but I pity the man overplaced."

Farm homes are preëminently places where self-culture may receive its highest incentives. The primary reason for this is the fact that there are fewer outside influences to distract the mind. Many complain of the isolation, and say farm life is lonely and out of the world. This is certainly true to those who make no effort to form a "Home out of a Household," but to the men and women who provide their families with the best newspapers and books which can now be purchased at comparatively small expense; to those who provide home entertainment for their children, who in short live at their best, the farm home offers excellent advantages for the early training of good citizens. When we learn from statistics that nine-tenths of the crimes in the world are committed between sunset and sunrise, we need be thankful that our farm children are away from the proximity of associations which draw them from home.

Some complain that it is too hard, involving too much care and labor; now this reminds me of a little advice given many years ago. A young man wrote to Henry Clay, I think it was, asking his advice in regard to the choice of a profession. "I want something that will be easy," wrote the young man. The answer that he received was very much like this: "My young friend, don't choose the law; some of our hardest worked men are lawyers. Don't choose medicine; there is a great amount of labor involved there. Don't choose the ministry; a successful pastor is a very busy man. Don't be an editor or an author; many work hard for years before they are fairly recognized. Don't be a scientist or explorer, there is nothing easy about that. Alas, my boy, in this busy work-a-day world there is small chance for the young man who makes his ease first in consideration. History records it as a fact that the successful men and women are the busy ones."

I was impressed with this fact when recently reading the biographies of the new representatives in Congress, who took their seats for the first time on December 4th. Many of these new members are emphatically self-made men. The number of country-born members representing city districts is surprising. It brings to memory, says the Buffalo Express, the fact that most of the presidents of the United States—in fact most of the country's greatest men were country born. Truly, many, very many, of the most useful men and women the world has ever known have passed out from the culture and quiet of farm homes to mingle with the world—thereby ennobling and enriching all with whom they came in contact.

In a recent publication I noticed this article: Among the moss-grown, stereotyped jokes in the great cities, none is more popular than that which refers to the farmer as a "hayseed," and makes sundry more or less humorous reflections on his ignorance of worldly ways. But when you come down to the solid facts, the city chap is not so torrid after all; and what he does not know about the most simple and natural things would fill a book. Even in cultured Boston, the "Hub of the Universe," where wisdom abounds and knowledge has its home, this ignorance is astounding. Some time ago a large number of school children were examined on various subjects, and some of the results were startling. Thirty-three per cent. of these children on entering school had never seen a live chicken, 51 per cent. had never seen a robin, 75 per cent. had never seen a growing strawberry, 71 per cent. of the Boston children had never seen growing beans, even in "bean-eating Boston." Their school text-books are based on country life, and the city child knows nothing in the large cities of the real life there. In the face of these facts one can readily understand how it is possible for many of our farm boys and girls to compete fairly and often outstrip those bred in the city, when placed side by side with them, which is a conceded fact by many of our best educators.

The knowledge gained by daily association with the flowers and plants, the birds and bees, the fields and the animals feeding quietly therein, broaden and enrich the childish minds, and make them more receptive to practical knowledge. We live in a State of whose people and institutions we may well be proud. She stands first in professional education, and one of the first in all general education. The farmers are not neglected. There is a special course on agriculture at Cornell University, there is a home course of instruction, of recent introduction, where the student may pursue his studies at home. There is the Experiment Station at Geneva, from which are sent valuable bulletins to all farmers desiring them, free of charge. Prof. W. H. Jordan of this station, has secured a very strong corps of scientific workers. Mr. Harding of Wisconsin, has been secured as dairy bacteriologist, he having given especial attention to the study of bacteria, both in this country and in Europe. Mr. George A. Smith of varied and wide experience, has been secured as dairy expert. There are farmers' institutes at the expense of the State, where experts are sent to deliver lectures and answer questions.

A successful farmer must keep up with the times. He must not stay at home and sit by the fire, and wonder what they are talking about down at that farmers' institute, and what those professors will have to say. He must go down with questions, and paper and pencil in hand and make the best of his advantages. He must not be contented to farm merely as his father and grandfather did before him. Times have changed, and he must study the value of fertilizers, and when the suave phosphate agent comes along, must know something of the value of various phosphates, which he can find from the helpful bulletins sent out, and know that he does not take sand for a good specimen, nor should he be so easily overruled as to neglect the valuable fertilizing elements of his own farm, and buy instead a commercial fertilizer of doubtful value.

Past National Master Brigham, at the National Grange, held in Harrisburg two years ago, stated that the development of the farmers' bulletins had been most rapid. Special appropriations were first made for them by Congress, the members of which are entitled to two-thirds of the number printed for distribution. Soon, however, members of Congress solicited and obtained nearly four-fifths of the total number, more than 2,400,000 copies; an increase of half a million over the year previous were then printed, and the demand bids fair very soon to exceed the supply.

These are encouraging signs of the times, and when we read that nearly forty per cent. of the voting population are farmers, and may decide the result of every election, it is of great importance that their power be wisely exercised.

Farmers' organizations aid greatly in concentrating force. In Michigan particularly, there are many prosperous and influential farmers' clubs. Probably no other state in the Union has so many. Several years ago these clubs were brought together into a State organization, which has proved remarkably successful. It is safe to say no other organization in the State has a greater influence upon legislation; and the result has been one of the cleanest administrations that the State has known for some time. It is strictly non-partisan in its demands and suggestions. The power of combined farmers seems almost unlimited if exercised in the right direction.

We are accustomed to look upon the American railroad system as of almost paramount importance in the interests of the country; but I was much interested some little time ago in reading the report which the Interstate Commerce Commission had just issued. By comparing the railroad figures with those of the agricultural products for the same year, it was found that only the corn crop of one year would be sufficient to pay all the railroad wages and salaries for 1896, and leave a surplus of more than $98,000,000. The railroad business does not begin to compare in magnitude with that of agriculture. In fact, the railroad, like all other business enterprises, lives on the products of the soil and its money is made by handling and sorting what farmers have grown and others have handled.

I have recently read several articles on the lack of good reading in our farm homes. Now, from my own knowledge I think many of these homes are as liberally supplied with good reading as are many of those who are following other professions. That there is a general lack in the majority of all homes of a careful study of current topics, and a general knowledge of the life around us is a fact to be deplored. Children who are early taught in the home to become interested in the forms of government and those who govern, are forming the basis of good citizenship. Many housewives and mothers complain of their utter inability to find time to read much, although papers and books may abound.

No one with a practical knowledge of the average home-life denies that the housekeepers of the present day, often with incapable help, and many of them with none at all, are decidedly busy people; but we read women cannot do too much to make home attractive. Every investment to this end is better than one in the bank. Just in proportion as we make our homes happy may we hope to save our children from outside snares and devices.

Although "Cleanliness may be next to Godliness," even this can be overdone. We all admire well-kept homes; where the carpets are bright and free from dust; where the polished floors are always clean; where the china and silver never grow dull and tarnished, and where the dust never forms on the immaculate upholstery; but if this commendable state of affairs be reached only by the mistress of the home becoming a veritable household drudge, it is purchased at a great sacrifice. If the wearied mistress of this beautiful home has no time to read, no time to cultivate flowers, no time to visit her neighbors, no time to amuse and instruct her children, no time to be an agreeable, social companion to her husband, then indeed the neatness which is commendable has deteriorated into the neatness that is detestable.

The majority of our farm homes are happy ones, where the best lessons of all our lives are learned; but while we as housewives and mothers are careful lest the dust gather in our homes, let us remember the wholesome words of Dora Read Goodale:

"Don't let the dust gather on your ideals, they are the best part of your mental furniture. Don't let the dust gather on your enthusiasm. Don't let the dust gather on your vows—your church vows, your marriage vows. They are as real, as binding, as when the good pastor laid his hand on your head, as when you stood at the altar with the man that you loved. Don't let the dust gather on your blessing; a diamond covered with dust seems no better than a stone."

We are told that history repeats itself; if this be true then the boys and girls in our farm homes to-day are, many of them, those to whom the nation looks to bear the grave responsibilities of the future. It behooves us then as earnest thinking men and women to guard well these homes. To put forth our best efforts to make them places of peace and refuge. Places where life's best ideals are formed, fostered in growth by love and care, and sent out into the world around us there to become blessed realities, helpful in this life and in that other life which is eternal.

Does Farming Pay?

By Rev. O. T. Fletcher, Altamont, N. Y.

Judging from certain conditions as they prevail to-day one might conclude that farming did not pay. That conclusion is easily arrived at if one considers only the fact of the exodus of the population from the country to the city, or the heavily mortgaged condition of the great majority of the farming property of the State, or the run-down condition of so many farms, or the low price of farm produce and the high price of farm labor and farm machinery; and, along with these facts, hears the farmers' cry of " hard times," " poor crops," and " heavy taxes." These things would seem to say, " Farming does not pay."

But not by these signs alone can the question be correctly answered. The profitableness of farming depends upon two factors, viz.: the farm and the farmer. And the former depends for its worth as a factor upon the ability of the latter. The State recognizes this fact and is seeking to make farming a more profitable business by improving, not the farm, but the farmer. The State hopes to enhance the value of farming to the farmer, not by lessening taxes or by giving bounties, but by equipping the farmer for better work.

There are three kinds of farmers who never make farming pay. Farming does not pay to the indolent farmer. The man that is lazy cannot succeed on the farm. Nor can those fellows who sit around the corner grocery or blacksmith shop and cry " hard times " when they ought to be at work. Away back in the beginning, God said to the first man, " In the sweat of thy face shalt thou eat bread." What wonder is it that he doesn't have it, if he doesn't sweat for it.

Ben Franklin, you know, said:

> " He that by the plow would thrive,
> Himself must either hold or drive."

My father had no conflict with Dr. Franklin but he taught us boys that

> "He that by the plow would thrive,
> Himself must always hold and drive,"

and that from early till late without soldiering. If a man is no friend of work he had better not attempt to make farming pay. He may do well enough under a boss, but the farmer who succeeds must not need driving to his work or to be watched to be kept at it. He who succeeds must have ambition enough to work and work hard. Laziness never succeeds—except in being lazy. In farming as in every other business it pays to hustle. Farming will not pay if you don't try to make it.

Farming does not pay to the indifferent farmer. You can generally tell a farmer by his farm. It is easy enough to tell if a man is interested in his work. The farmer that likes to till the soil puts something of his soul as well as his mind and muscle into his toil. He cares for things and takes delight in them. It pays to take good care of the stock. It pays to keep up the fences. It pays to keep the shingles on the roof and the doors on the hinges. Every successful farmer knows that. It doesn't pay to leave the plow in the furrow from December to May. It doesn't pay to leave machinery out in the weather from one end of the year to the other. It pays to keep the trees in bearing condition and the soil fit for a crop. Indifference in regard to these things precludes success. The man who doesn't care, doesn't make farming pay. Carelessness costs; pains pay.

Farming does not pay to the ignorant farmer. The advice one artist gave to a younger one was:

"Mix your brains with your paint." Mix your brains with the soil, is no less good counsel to the farmers of to-day. It is more needed to-day than ever. Farming is developing into a scientific process. To-day the more a man knows about farming in all of its branches the better farmer he will be and the better success he will make. Brains are the best fertilizers. The hope of farming is the education of the farmer. Thinking and studying along the line of one's work pays in every line of business. Mind is worth more than muscle. Intelligence enhances the worth of a ditch-digger. Farming is no narrow field for study and experiment. Think of the variety of soils and the things one must know to determine the best crop to raise and the ingredients necessary in the soil for the best results. Consider the various and great variety of things a man ought to know about stock. What shouldn't he know about horticulture and plant life? He should know something of seeds and fruits; of markets and the things which influence them; of methods, means and machinery. He should be something of a chemist, a botanist, a horticulturist, a mechanic, a political economist and a veterinarian. He has been all too long just a digger in earth and a horse jockey. But thanks to the printing press, the district school, and the awakening generally to the fact, old as Solomon, that "The man of knowledge increaseth strength." The successful farmer is a man of no mean ability. He has ambition, enthusiasm and intelligence. To such men farming pays. It pays, although it may not at first thought seem to. Pay is not always to be reckoned in terms of dollars and cents. I am sure farming so pays. I am of the opinion that the man who cannot make farming pay wouldn't make anything pay of which he was the manager. Too many have an idea that farming requires neither industry nor intelligence. It is a dangerous fallacy that a man can run a farm when he can do nothing else. There was a time when almost anyone could do well on a farm, but that was when the soil was rich in its virgin fertility, markets good, and competition small. It is not so now.

But money is only one consideration. There are other things of greater worth than bank accounts for relatives and children to quarrel over and squander. Perhaps more money can be made in other pursuits, but there are some advantages which more than make good the loss. These we must consider in determining the profitableness of farming; for that must be reckoned both in terms of money and manhood, of wealth and health, of currency and character. The loss in one is often compensated by the other. In one section of the State there may be most money in raising grain; in another, fruit; in another, hops; in another in producing milk; but in every section the tiller of the soil has the advantage over his city friend in location, occupation and association.

His location is being rid of its disadvantages by the telephone and telegraph; by cheaper, but good books and periodicals; by labor-saving machinery; by steam roads and trolley roads and by many modern inventions whereby the benefits of the best things are placed within his reach. On the score of health the farm out-classes the factory. The farmer eats pure food, drinks pure milk, slakes his thirst with water of crystal purity as it bubbles out of the hillside clear and cool, breathes the purest air, and inhales the invigorating fragrance of nature's richest perfume; his nerves are saved the strain of the ceaseless hum of factory noises and the commotion and confusion of commerce; he spends his days in God's sweet sunshine and his nights in the radiance of his own fireside. His brother toiler in the city knows none of these, except at rare intervals. His food is not always fresh, nor his surroundings conducive to good health or long life. The man on the farm comes near to nature and receives the virtue of the touch. He looks into the blue sky and star-studded heavens; he sees the rose as it buds and blooms, living things as they grow; he hears the songs of birds and breathes the perfume of apple blossoms and the scent of new-mown hay; and in his home he enjoys the comforts of art and music. His children are blessed with vigor; his home comes near the ideal. It was Burns the poet of the farm who gave the world "The Cotter's Saturday Night." For home life there is no place like the farm. For the training of children and the developing of noble manhood there is no place like the farm. By location, occupation and association it is the place for laying the foundation of a good intellectual development; the place for building up a strong constitution; the place for establishing the framework of a noble character. Think of the privileges and opportunities of farm life: Those long winter evenings for social and intellectual improvement; those hours of solitude and quiet. What times for thought, and reflection, and study! What moments for meditation on things divine and eternal! What aspirations, what inspirations as he communes with mother-earth! What liberty is his! What freedom! No wonder we are a free people. The sense of freedom was born in the soul of the farmer. It was a lot of farmers led by a farmer who repelled the foe at Lexington and Bunker Hill, at Brandywine and Yorktown.

It is said of Anteaus that no one could throw him in wrestling except Hercules who succeeded .only by first lifting him from contact with the ground; his strength came from contact with the earth. With the farmers rest the future of this republic. From the farm have come the men of might who have filled places of trust. One-third of the present Congress is from the farm. More than half our presidents were farmers' sons. To the country must we look for the strength to replenish the wasted energy and vitality of the city. After three or four generations the strenuous activity of city life and public service consumes the strength derived from contact with the soil. It is from the soil that men have received that impetus, that inspiration, that ambition, that industry, that manhood, that character, that strength of body, mind and will that gave them power to outstrip their fellows in the race for lofty service. Such being the worth of rural life, it pays to till the soil.

Question Box.

[This interesting feature of our institute meetings is yearly growing in popularity, and justly so, for in the "Question Box" is brought out the practical side of farm life, expounded by active and progressive farmers whose experiences and practices cannot help benefiting brother farmers. However, it is impossible to give, in the small space at our disposal, the "Question Box" of each institute, where so many are held, for to do this would require a special work in itself. Again, not all questions asked are of general interest, the majority being of a local nature, and frequently the same questions are asked and answered at various institutes; so that we have endeavored to select from an almost interminable mass of manuscript questions and answers which, if they do not contain new ideas and suggestions, will, at least, act as reminders and furnish food for thought and mental digestion.]

POTATOES.

How do you fight bugs?

Mr. Litchard.—I pulverize 100 pounds of plaster and thoroughly mix with it one pound of paris green. As soon as the plants are well up, sprinkle the mixture on the hills. This will kill the "shell backs" to a large extent and prevent the appearance, in great measure, of the slugs.

What condition of soil do you favor for potatoes?

Mr. Litchard.—A good, well-fertilized and fitted clover sod, plowed seven to ten inches deep and thoroughly fined to a depth of at least five inches, and the surface as free as possible from stones and clods.

What variety of clover do you sow?

Answer.—Medium red and alsike, two quarts of the former and four quarts of the latter.

What do you do to prevent scab?

Answer.—Scab is a fungous growth. It may be in the soil. Do not plant seed that is scabby, nor plant clean potatoes on land where scabby tubers grew the year before. A preventive is to soak the seed potatoes in a solution of corrosive sublimate and water, two ounces of the poison dissolved in fifty gallons of water. Soak the seed an hour and a half, but never leave a scabby potato lying on the ground, nor put one into the cellar. Boiling the scabby tubers will destroy the germs so that they will not infest the soil if they are thrown on the ground. The cooked potatoes may then be fed.

What variety of early potatoes do you prefer?

Answer.—Early Puritan, Early Sunrise and some others are all good with me. It is well to study the habits of different varieties and adopt those which are best suited to your soils, climate and conditions. Begin in a small way and, if you are successful, like to grow the crop and can market it profitably, enlarge your field.

Do you use a digger, or dig by hand power?

Answer.—I use a digger drawn by four horses and put the tubers into the cellar for one and a half cents per bushel. This is a great saving in the expense incurred over the old way, and enables me to sell my crop a little less, if necessary, and still make a fair profit.

Speaking of prices, he said that an investigation made recently revealed to him the fact that the average price of potatoes in his county had been forty-five cents and a fraction for ten years. He also said that his crop had averaged him 125 bushels during the last ten years. He also said that the general average yield of potatoes is but seventy-six and one-half bushels per acre and that of wheat twenty-two and one-half bushels. He also gave the average yields of some other crops, and told the per cent. of nitrogen, potash and phosphoric acid removed from an acre by these crops, all which showed that potatoes removed less fertility than does wheat or beans. He also favored potato growing for the reason that one has a money crop to dispose of in winter when we do not get much from the dairy. Therefore he grows potatoes in preference to wheat or beans.

What varieties do you raise?

Answer.—It has come closer to the question of form or shape, round potatoes being most in demand and at better prices. My preference is Rural New Yorker No. 2, Carman No. 3 and Sir Walter Raleigh. They all belong to the same family and are known as round potatoes.

Do you roll the sod after plowing it?

Answer.—Yes, we use a heavy roller—one weighing 1,750 pounds—and let it lap one-half. This packs the furrows hard. After this we harrow deeply and make the seed bed fine. We plow the clover sod sometimes as deep as ten inches; this when the field has been worked down deeply and well manured. If it has not, we do not plow so deeply.

Can blight on potatoes be prevented by spraying? What do you use?

Mr. Litchard.—It may be prevented, but then there is no cure. Spraying has been practiced through the State with the Bordeaux mixture. Some make two applications; some three. Scab is another disease and is a soil germ. The best way is not to plant seed that has any scab on it. Don't put any scabby potatoes in the cellar nor plant them on land where scabby potatoes grew the year before.

Mr. Cook.—Soak the seed potatoes in a solution made by dissolving two ounces of corrosive sublimate in fifty gallons of water. Leave them in the solution two hours.

Which is better, hill up or use level culture with potatoes?

Answer.—It will depend somewhat on the soil. As a rule nearly level culture is best.

When one has land that is adapted to both wheat and potatoes, which will be the better money crop?

Answer.—Wheat will take the most fertility from the land. One hundred bushels will remove $29.50 worth of it; potatoes, $5.20. The man who knows how to grow potatoes will get the most money from potatoes.

What is the best method of growing potatoes near Madrid?

A Farmer.—I do not raise many potatoes, but I plow my land deeply, turning under as much manure as I can. The rows are furrowed out three feet apart and the seed dropped eighteen inches apart. I grow from 300 to 400 bushels per acre, and have no trouble in growing smooth, handsome potatoes. But the main point is in having good seed. My land is a limestone soil, which produces good potatoes.

Mr. Litchard.—We raise a good many potatoes in our county, and we find a dry, loamy soil the best, both for quantity and quality. We prefer a clover sod, either for corn or potatoes. Since we have our silo, we follow potatoes with corn. Our manure is all drawn out as fast as made and spread on the sod.

Mr. Pickens gave his method, which did not vary much from Mr. Litchard's, although he uses a hiller, while Mr. Litchard does not.

Mr. Litchard.—There are three essential things necessary to grow potatoes: First, soil; second, seed; third, sense; but the best results are obtained when the crop receives constant cultivation; so I never would put in a shovel plow, for the reason that it cuts off the small feeding roots. Give only level shallow cultivation.

Will the planting of ill-shaped potatoes produce the same?

Answer.—In the main, yes. As a rule, one gets about that which he plants or sows.

At what season would you advise planting potatoes for the local markets?

Answer.—Be governed by climatic conditions and soils. If you are in a high altitude, get the seed into the ground as early as possible. We want to have them ripe before the early fall frosts.

To Dr. Jordan.—What is the cause and remedy for scab on potatoes?

Answer.—The germ that causes scab on potatoes lives in the soil. I am not a bacteriologist. We ought to have about twenty men in a force to answer all the questions that come up. The soaking of the seed in a solution of corrosive sublimate, one part of the poison to 1,000 of water, is said to prevent it. It is caused by an alkaline condition of the soil. Lime and wood ashes contribute to it.

To Mr. Terry.—Will lime, used on land, cause scab on potatoes?

Mr. Terry.—Dr. Jordan says that an alkaline condition is favorable to the appearance of potato scab. Lime contributes to it. We know that the scab germ will continue in the soil at least three seasons. If the germ is in the soil no amount of soaking of the seed will prevent scab on the tubers.

Will Mr. Terry tell us his experience in spraying potatoes, also tell us what implements he uses to furrow out his potato rows?

Answer.—I began spraying potatoes several years since, using a horse-power pump. Have used both a planter and a device of my own. The latter has proved best, which plows the furrows—two at once, throwing them in an opposite way; the seed is then dropped in the furrows, then levelled with the harrow. It costs more than it does to use the Aspinwall planter, probably one dollar per acre, but it pays.

What do you say about plowing under rye for potatoes?

Answer.—I prefer clover, for the reason that it furnishes nitrogen from both tops and roots, also humus, which potatoes need. Rye will produce humus, but no nitrogen for the potatoes. But there is more danger from plowing under a large crop of rye than of clover, because there is more danger of producing acid in the soil. I would most certainly try clover in preference to rye.

What variety of potato is the best for market?

A Farmer.—Green Mountain, of late, has proved best. We raised last year, 4,000 bushels. Some fields yielded 240 bushels per acre. We have also grown Carman No. 3. It is good, but does not produce as heavily as does Green Mountain or Rural New Yorker. In fact, the two are so nearly alike that one is sold for the other by some farmers. On some soils, last year, Green Mountain was much more scabby than were some other varieties.

Mr. Cook.—The difference may have been caused by differences in the soil, it being a germ which is more prevalent in some soils and in some seasons than in others.

Mr. Terry.—The conditions last year were more favorable than this for developing the blight, which as a rule caused the difference in results. With us, Carman No. 3 and Rural New Yorker are the two great market varieties. But we never plant any seed until after it has been treated with corrosive sublimate to kill any scab germs. We use two ounces of the sublimate dissolved in fifteen gallons of water, in which the seed is soaked an hour and a half. There is another preparation known as "Formaline," in which the seed is soaked. I have never used this, however. Be careful in using the sublimate, as it is a deadly poison, and do not allow any live-stock to drink from the vessels used; also be careful and pour the poison water where it will do no harm, nor should you put any treated seed in boxes or barrels which have contained scabby seed. Nor would I plant potatoes in ground where scabby tubers grew the year before.

To Mr. Van Alstyne.—Will hen manure if used alone when planting potatoes burn the seed?

Answer.—There is some danger, particularly when the season is dry. The same is true of commercial fertilizers. I would not allow either to come in contact with the cut seed.

How should we use phosphates, on top or under potatoes?

Answer.—My practice has been to broadcast the fertilizer, then, sometimes, to make a second application at the time of the last cultivation.

Is it safe to use hen manure and wood ashes on potatoes when planting them?

Answer.—I would not use the ashes; they seem to have a tendency to cause scabby tubers; nor would I mix them with hen manure because they will liberate the nitrogen in the manure and allow it to escape in the form of ammonia. I would apply the two separately, unless I were going to plow them under at once. South-Carolina rock would be better to use with the manure, because we would get a good supply of phosphoric acid, which, as a rule, is most needed.

To Mr. Chapman.—Which shall we do, plant potatoes deeply or shallow?

Answer.—In a large number of experiments made at the stations in the United States, results showed that about four inches gave best results. A depth of eight inches has given good results; so has a depth of but two inches; but the average was not as good as from those planted four inches deep.

What is the essential thing to be sought for in growing potatoes?

Answer.—I believe that it is to obtain a strong, vigorous, healthy growth of leaf. The tuber makes the most of its growth during the last two weeks, therefore there must be a good supply of starch in the leaf to send down to the tuber. If the foliage has been eaten by bugs or has become blighted, this supply will be cut off.

Which variety of potatoes is most valuable, and why?

Answer.—Round potatoes bring more in the market than do long ones. The Carmans are the favorite now, Rural New Yorker seems to be running out; but there are some dealers who are selling any round variety they have for Carmans.

What can I do to prevent wire worms working in potatoes?

Answer.—Plow the ground in the fall, just before it freezes, and give a short rotation of crops, to destroy the worms.

Mr. Hardy.—My potatoes were worm eaten, but a neighbor planted corn-cobs in his potato hills. The worms left the potatoes and congregated on the cobs. I saw them, myself. The potatoes were clean, and I shall try the experiment myself this year.

Mr. Converse.—That might do in the garden, but I would not care to try it on two or three acres.

What variety of potatoes give the best returns on clay soil, on hillside land?

Mr. Cook.—How many of you grow potatoes? (Nearly every hand went up.)

A Farmer.—Carman Nos. 1 and 3 are best.

Another Farmer.—Rural New Yorker does best with me, but Uncle Sam is another good one. There's a week's difference in the season of Carman Nos. 1 and 3.

To Mr. Van Alstyne.—How do you plow potatoes, and how do you grow them?

Answer.—I plow as deeply as I can, for potatoes. On most of our soil I plow about nine inches—we want coolness and moisture. We plant in drills, putting the seed in about five inches then use the smoothing harrow, followed with the weeder, then the cultivator deeply, at first, then at a shallow depth, thus giving practically level culture, no hilling is done and the feeding roots are left undisturbed.

Potato planting—deep or shallow—which? In hills or drills?

Mr. Terry.—On land that is well drained—which should be on all land for potatoes, I think that four inches is the best depth; which means four inches below the surface when leveled off, after planting. We cannot afford to tear off the roots when cultivating, which results when the seed is put in the ground near the surface, in check rows, and the hilling process is followed, so we practice drill-culture. In this way the tubers are kept under, so they are not sunburned.

How about sulphur to prevent scab on potatoes? How shall we use it?

Mr. Terry.—It has been used for the purpose by dropping it in the hills. We prefer the corrosive sublimate, however.

Which are best for seed—whole or cut potatoes?

Mr. Converse.—As a rule, the largest potato growers cut their seed, leaving two or three eyes on each piece. But the seed potatoes should be kept where they will not sprout before planting time. I would not plant too small potatoes nor too large ones. Cut seed will be found most profitable.

How can we grow 300 bushels of potatoes per acre?

Mr. Cook.—With us the first fault is an improper preparation of the soil and the need of humus and fertilizers. Potato soil should be deeply plowed, well pulverized and fertilized. The next trouble is poor seed. Seed potatoes ought never to be allowed to sprout in the cellar, because it injures their vitality. The third reason is neglect of the crop when the fungus and bugs attack the vines. If a good crop of tubers is secured, there must be a good, strong healthy growth of leaf and stem. To obtain that, the seed must be good, the cultivation proper and constant and the vines sprayed with the Bordeaux and the poison, to forestall the blight fungus and the bugs.

How should we dispose of our small potatoes?

Mr. Cook.—Feed them in moderate quantities to the cows, providing they assist in balancing the ration. They are rich in starch, so should be fed with protein foods. There is succulence enough in them. A few oats, some bran or cotton seed meal will balance them. If you have ensilage, take it out, but I would not feed more than a peck at first; possibly the amount may be increased a little at a time, till more are fed. It will depend on the cows's ability to digest and assimilate them, together with the other foods eaten with them.

Should ground be rolled before dragging for potatoes?

Mr. Converse.—I would certainly roll a clover sod, to pack the furrows closely. Then I would finely pulverize it and fine the surface before planting the potatoes.

What is the value of potatoes as a milk-producing food?

Mr. Litchard.—Fed judiciously—that is, not too many, and with other proper foods—I think they are worth for such a purpose eleven cents a bushel.

Mr. Cook.—When potatoes are worth twenty-five cents a bushel the question is not worth considering. I used to think that potatoes could not be fed and good butter and cheese made, but I have changed my mind somewhat. Begin with two quarts and increase the quantity gradually up to a peck or more, when they are low enough in price.

What is the best potato digger on the market?

Mr. Litchard.—The Hoover is the best digger I have tried so far. But there may be a better one, however.

To Mr. Fenner.—Do you plow your potato ground more than once?

Answer.—No, sir; we do not plow it but once. In Erie county we do not farm for amusement. But we fit the ground well; then thoroughly cultivate the crop.

HORSES.

When should a horse be watered, and how much should he have?

Dr. Smead.—As a rule, when the horse wants water let him have it, using good judgment in the amount he takes and the condition he is in. If he is very thirsty and hot, allow him to drink but a few swallows at a time, but have the intervals short. I never saw the horse nor the time when I would not give him some water. Exercise the same judgment you would with yourself. If a man or woman is wise, they will take a swallow or two, at a time, at intervals. You may crave a quart, but do not drink it. The stomach of the horse holds but about three gallons, so it is of no use to allow him to swallow more; if he does it will not pass through the stomach.

Should horses have a hay ration before eating their grain?

Dr. Smead.—As a rule, yes, as the coarse food already eaten will prevent the grain compacting in the stomach. At the same time it will be more easily digested than if fed before the hay ration is eaten.

Is rye a good food for horses?

Dr. Smead.—I may run afoul of a snag, but I shall say no. If I had rye I would sell it and buy something else. It is not at all suited to the ordinary horse.

Would you grind oats?

Dr. Smead.—Not, if the horse had good grinders. I would prefer to let him do the grinding, instead of taking the oats to the mill and take my chance of bringing him an indefinite quantity.

Is there anything better than good oats to feed horses, ordinarily, in connection with timothy hay?

Mr. Litchard.—I would take off a part of the oats and substitute bran in place of them. The horse, like other animals, relishes a variety, and will thrive better than when fed all the time on one food.

What foods are best for a colt during the winter?

Mr. Litchard.—Good clover hay and oats.

Dr. Smead.—Mixed hay, red clover, alsike and timothy, cut when the red clover is in bloom, is best. Such hay has a nutritive ratio of about 1 to 7. Feed the colt what it will eat in an hour. No more. If more, his digestion will be impaired. For the grain, half a pint of oats and a fourth of a pound of bran to each 100 pounds of colt, will do.

Please give a good ration for a horse?

Mr. Ward.—It would depend somewhat whether the horse was being worked or not. Such a horse would require a different ration from one standing idle. There is no better grain food than oats. If the hay fed is clover and the grain, oats and bran, a little corn meal should be added, but don't feed too much timothy hay, only just what will be eaten up clean in an hour.

If you were going to feed corn and oats to a horse would you feed both grains whole?

Dr. Smead.—No, I would grind them together, because corn ought not to be fed whole. But I would not feed corn and oats mixed, because I find at least one horse in thirty that cannot eat corn at all; if a horse can stand it, there is no better feed for a horse doing heavy work than corn and oats mixed about half and half.

What is the best ration for young colts?

Mr. Van Dreser.—I know of nothing better than wheat bran, oats and clover hay; skimmed milk is also good. We fed wheat bran with it and made a growth of over 60 pounds in 30 days. Not more than a pint of oats, three times a day, was fed.

What is the feeding value of buckwheat straw for horses? Will they eat it?

Mr. Ward.—Horses will eat good, bright clean buckwheat straw in preference to hay. It is one of the best foods for horses; they will eat it readily. But it must be clean, bright and well housed. I do not recall its nutritive ratio, so that I cannot tell just how it compares in feeding value with other straws.

Should salt and ashes be fed to a horse?

Dr. Smead.—Salt has a good effect on liver and some other organs, and should be given in small amounts. We find that some wild animals, such as deer, eat it, and our domestic animals do the same. So I would give it to them. So far as ashes are concerned I will say, "don't feed ashes." We use the lye from them, in connection with grease, to make soap. If an animal swallows ashes, the lye from them when the liquids of the stomach release it, cannot help but injure the animal.

Is it essential for horses or cattle to be groomed every day and the stables cleaned every day?

Mr. Cook.—Clean the horse stables every day and put the manure behind the cows in the gutters; then groom the horses. Do it every day.

THE PIG STY.

What is the best feed for young pigs?

Mr. Litchard.—Milk first, then mix wheat middlings with it.

Mr. Cook.—When they are a little older throw in a little whole corn, and I would add a little oil meal to the ration of the young pigs.

A Farmer.—The best pigs I ever saw were fed barley meal.

Mr. Smith.—Skimmed milk and wheat middlings make a good combination. Don't feed them wheat bran; a little cracked corn will make a good mixture; not much, but some of it, as the pigs seem to like it very much.

Will it pay to grow rape for hogs?

Mr. Ward.—Yes; decidedly. One of the largest swine breeders in our county grows a large quantity of it for his hogs, and says it pays better than grain. But do not feed it to milch cows, as it taints their milk. Horses will not eat it, but every other animal on the farm will.

Has the Geneva Station had any experience with the Tamworth breed of hogs?

Dr. Jordan.—We have a Tamworth male in our pens and are crossing him on the Jersey Red. It has less hair and we believe the cross will make a good bacon pig. Some farmers object to the long nose of the Tamworth, but I do not care for that. We cannot afford to grow pork for packing here; its day has gone in this State. Bacon for home use and export is now in best demand.

To Mr. Cook.—At what age would you slaughter a pig, fattened, for most profit?

Answer.—It would depend very much on what I had to feed him, and the price of foods as well as that of dressed pork. Where one has good, sweet separator skim-milk or sweet whey, with wheat middlings as a starter, to be followed with some one of the fattening foods, the cost would be less than where all the foods were bought. At present price for foods and pork, however, I think that 150 pounds, dressed weight, would be about the limit. I do not believe one could afford to grow a pig above that weight.

If you could keep but one breed of hogs, what would it be?

Abel F. Stevens.—The "White Victoria."

What is the value of whey for feeding purposes?

Mr. Cook.—Whey is worth a good deal more than we get out of it, as a rule. About one-half of the total solids of the milk when made into cheese pass off in the whey. All the milk sugar—about five pounds—the albumen, the ash, some fat and a small per cent. of caseine, making fully six pounds, go into the whey vat. When this whey is used just as it comes from the cheese vat, if it be fed to pigs, with wheat middlings, fully seven cents per hundred pounds may be got out of it. As a rule, however, we do not get half that. I have experimented and know that whey is worth more for feeding pigs than for any other purpose. If you will, next spring, spend the time you do in figuring down the making price of cheese a fraction of a cent, and use it in devising some method of better utilizing the whey product, you will be better paid. It is almost a perfectly balanced food, that is, the solids of it. But, as there are but six pounds of these solids in 100 pounds of whey, the balance being water, it will be seen there is only a small per cent. of the whole that is valuable.

Mr. Van Wagenen.—We are feeding buckwheat middlings and skim-milk to pigs, in preference to corn meal. It is not right theoretically, but, when we can buy buckwheat middlings for $12 per ton as against corn meal at $18, we are satisfied it pays to let the pigs burn protein instead of carbohydrates in their bodies. Understand, I am not advising this, except one is situated just as we are and the same market conditions prevail.

CONCERNING CALVES.

How many pounds of milk will it require to fatten an ordinary veal calf?

Mr. Windecker.—I estimate it at 20 pounds a day. At six weeks it would amount to $6. All above $7 for a calf at that age is profit. The estimate is on the basis of 150 pounds weight for the calf, with milk at $1 per hundred pounds.

Mr. Smith.—When calves bring but 4 cents a pound, the cost will be more, will it not?

A Farmer.—It would depend upon the calf. A small one would not develop up to that price—$7.

Mr. Windecker.—I would not start a small calf. It would not be worth fattening.

The Farmer.—I have experimented with two calves. The first week I fed two and one-half quarts of milk per day, the second week three quarts, the third week four, and the fourth week five quarts. These figures are for one feed. They should be doubled for 24 hours. The calves weighed 276 pounds, gaining two and one-half pounds per day the last week.

Is it profitable to feed whey as it comes from the factory to calves three to six months old?

Mr. Cook.—It is not profitable to feed some whey to calves; it depends on its condition. The milk sugar all goes into the whey, about four pounds in a hundred; then there is the ash and a small per cent. of fat, making in all about six pounds of solids. If the whey vats are kept scalded and the whey barrel clean at home it will pay to feed whey. If these conditions do not obtain it does not pay to feed it at all; it is a by-product and should be saved. The Standard Oil Company is now making the most of its money out of that which it once threw away

What is the best method in which to feed calves linseed meal?

A Farmer.—Put it into the milk and let them drink it.

Mr. Sampson.—I think it is better to cook it.

Mr. Litchard.—I saw it being fed in Henry Stevens' barn, at Lacona, to calves. They brought it cooked to the barn and added the milk to it.

Dr. Smead.—I have seen calves injured by feeding them linseed meal. I prefer to feed, first the milk and then either feed the ground flaxseed or the flaxseed oil. We want to add something to the milk to replace the butter-fat removed from it by skimming. I prefer, at first, a little jelly made of the linseed meal. It is not necessary to cook it, because it has been cooked in the process of extracting the oil from the seed. Later, when the calf has begun to eat something solid, the meal may be fed. It is dangerous to feed linseed meal to calves a week old.

What is the best feed for calves when one has not enough milk?

Mr. Cook.—Give the young calf, if it is worth raising, its mother's milk for the first two or three weeks, then gradually work off on to skimmed milk with some ground oats, wheat middlings and a little oil meal mixed with it. A little good sweet whey, with the foregoing grains mixed with it, makes a good ration. Our sweet whey paid us fully 7 cents per 100 pounds when fed in that way. But, if I were going to feed Jersey milk to young calves, I would take out some of the fat through the separator to prevent scours, which very rich milk induces. I believe that if one were going to raise calves, he could do no better than to go out and buy the thinnest, poorest Holstein milker he could find, and then feed that cow's milk unskimmed, to the calves.

Which is preferable, to raise calves or veal, or sell them?

Mr. Ward.—It will depend. If the calves are ordinary scrubs, veal and get rid of them just as soon as possible. Don't keep such calves on the farm a day longer than is needed to get them ready for the butcher. But, if they are good full bloods and have the requisites for making good cows, raise them.

Does it pay to veal heifer calves on a small farm?

Mr. Harding.—I buy young calves from milkmen, feed them milk from my herd till they are four or five weeks old, then sell them for veals, because I can get good pay for my surplus milk. Have got more money from my cows, through veals than I could from butter, unless I got a very fancy price for it. If, however, I had a good heifer calf from a good mother, I would raise it.

Can young calves be raised on separator milk alone, and how should it be fed?

Mr. Dawley.—I wish that every calf could have all the sweet skim-milk with some fine wheat middlings, oat flakes and a little oil meal it wants, the last named to replace, in part, the butter fat taken out of the milk. There will be no trouble experienced in raising a calf on good sweet, separator skimmed milk, with flaxseed jelly added in small quantities.

THE ORCHARD.

Which is the most profitable commercial pear?

Mr. Wood.—To-day Kieffer is my most profitable pear, with Bartlett next.

Mr. Hooker.—Dutchess has brought, all things considered, the highest prices so far as I am informed, when it was put in cold storage, held till late, then shipped to Europe, if well assorted and packed. It returned last season to some shippers as much as $13 a barrel. I believe it the most profitable pear to-day, when well grown and well packed and shipped.

Mr. Willard favored Kieffer and said there is no variety so good for canning to-day as a well-grown, matured New-York Kieffer. The Kieffers grown in the south and southwest are not fully developed. Their flavor is not developed in the can as is that from the New-York grown Kieffer.

What is the most valuable Japan plum from a commercial standpoint?

Mr. Smith of Geneva.—Our best Japans for commercial purposes are Wickson and Burbank. In our orchards on Seneca lake, Wickson is doing well. Although we have been fruiting it but three years, we have learned that it pays to thin the fruit very much, as it inclines to overproduce. We sold them for as high as $1.50 per bushel in New York last fall, when Lombards were selling there for but 50 cents.

Mr. Willard.—Red June and Burbank have proved most profitable with me—of the Japan varieties. Red June ripened as early as July 17th last season. My experience with Wickson has not been so pleasant as has Mr. Smith's, but conditions differ. and it may yet become one of the most valuable varieties of the Japanese plums. With me, all things consider, Burbank has been the most profitable of these varieties.

What about October Purple?

Answer.—I have fruited it several years, but would not recommend the planting of it very largely.

By Mr. Jennings.—Is it a truth that the Japan varieties are more immune from the ravages of curculio than are the European or our native varieties?

Answer.—I have never found them so, although I have watched them very carefully.

What of some of our native sorts?

Answer.—Hudson River Purple is doing quite well in western New York, but it is more subject to attacks of blackknot than are some others. I have been top-working some of my trees of that variety with something else, because of this defect.

Are there any new peaches of value?

Mr. Taber.—I would like to know if any one has had any experience with Fitzgerald.

Mr. Anderson of Geneva.—I have a few trees, which came from Canada. They have fruited. It is not very satisfactory. The last season the fruit was fine, however. The season is a little later than Early Crawford.

Mr. Willard.—Its quality is good. Mr. Morrell of Benton Harbor, Michigan, has made careful tests of the hardiness of fruit of several varieties, and has found this one ranking best.

What about Crosby?

Mr. Willard.—We have fruited it and found it very satisfactory. We have shipped it to Port Jervis and elsewhere, where it gave excellent satisfaction.

Mr. King.—It has not proved, so far, satisfactory with us. I live near Trumansburg, Tompkins county.

What of Phair's Choice?

Mr. Willard.—It is a fine late peach, and it succeeds excellently on the shores of Lake Huron.

Mr. Barns.—It is being grown by some of my neighbors, and by Mr. Quinby of Marlboro. He reports it a good peach.

There were some other of the new varieties named and described by Mr. Bogue of Batavia, and other growers present. Among them Triumph, which Mr. Willard said he regarded as of not much value, notwithstanding its name.

Mr. Woodward.—There is a seedling of Crawford in Niagara county which is better than Crawford in every respect. It has been named Niagara, and I would not plant a Crawford if I could get this seedling.

Another new variety, known as Willard, is said to be one of the best of the new sorts, its season being a little later than Crawford.

What of the Windsor cherry, one of the new varieties?

Mr. Willard.—It was introduced by Ellwanger & Barry. As a market fruit it stands pre-eminent as a sweet cherry. None has ever been introduced that approaches it. I have 50 trees. They are young, but they have already paid for themselves, the expenses of growing and caring for them, and the interest on the land they stand on. The fruit is large, hard and good. I can take three or four bites out of one. It sells well, the market price having been raised from 10 to 12 cents per pound last season.

George T. Powell.—Mr. Willard has left out one valuable quality, that of health and constitutional vigor. It has the power to withstand insect and climatic attacks, such as Black Tartarian, Black Eagle and some other sorts of like character and season, do not. Therefore I regard Windsor superior to all others in this respect. Then, too, it begins ripening in July, from the 6th to the 10th with me in the Hudson river valley, and keeps a long time. So it goes early into market and brings good prices.

What of the new variety of cherry known as Bing?

Mr. Willard.—I have it. The scions came from Oregon. It has fruited one year. Some of the specimens had a circumference of 3 to 3½ inches. It is the most promising of any of the newer varieties that I have. The man who has that and the Windsor will be a happy one. Montgomery is the most valuable sour cherry, with English Morrillo second.

Which variety of currant is best to plant?

Mr. Willard.—There are some new varieties not long since introduced that are among the best. Among them is President Wilder, a red variety, and White Imperial. The latter is not a commercial variety, but it has no equal as a table currant. I have grown Wilder a number of years. It produces on my grounds double the quarts yielded by Cherry or Fay, while the quality is very much finer than that of either of these old sorts. The children who pick our currants easily double their wages when they begin picking it.

George T. Powell.—I have taken as many as 16 quarts of Fay from a single bush. If Mr. Willard can beat that, I would like to know it.

Mr. Willard.—I take off my hat to that statement from Mr. Powell, and go to the rear.

W. D. Barns.—I do not feel confident to decide which is the best commercial variety to plant. Many currants are grown along the Hudson river. Fay drops its fruit, gets dirty, and is straggling somewhat in its wood growth, while Cherry is infested with disease. The old Victoria is a good one, but is not fully satisfactory for one or two reasons. Prince Albert is the latest to fruit of any in my grounds, but its color is light and therefore objectionable to some. President Wilder gives the best satisfaction so far. It is an upright grower, and the fruit hangs on longer, and is still fit for market, than does that of any other variety. I have several thousands of bushels of this variety, and the fruit has averaged two to four cents per quart higher in the market than any other variety, the color being fine and the quality fully as high, while the yield is much larger.

George T. Powell.—Currants at present are one of the most valuable of the small fruits which I grow, but there are some drawbacks. The currant worm is one, but it may be easily controlled. There are some other insect pests, some of them of recent date, that can not be so easily fought. There is a growing demand for the fruit, however, so that the grower can afford to be vigilant.

Will Dr. Van Slyke tell us what is the most hardy plum for this cold climate (Springville)?

Dr. Van Slyke.—I don't know everything. You will have to write to Prof. Beach, the horticulturist at the Geneva Experiment Station, for an answer.

Mr. Fenner.—I think that some of the Japan varieties would do best in this locality.

Mr. Converse.—These Jap plums are quite hardy with us in southern Jefferson county.

I desire information about grapes. Mine are on low, black soil, but do not bear fruit. But the vines make a large growth every year. Why do I not get more fruit?

Mr. Stevens, Mass.—That is a text for a long sermon. Undoubtedly the conditions of the soil are not good. Too much nitrogenous foods in the soil, or it may be the rose bug chafer. I could tell better if I could see the vines in foliage. A black soil is not fitted for the grape. Fertilize well with potash and phosphoric acid, and avoid too much growth of wood and foliage.

Mr. Van Alstyne.—What is the variety?

The writer of the question.—Rodger's Hybrid. It is a black grape.

Mr. Van Alstyne.—Write to the Geneva Experiment Station for their bulletin describing the various varieties and giving some directions for caring for them.

Is there any danger from an overproduction of good apples?

Mr. Van Alstyne.—As a rule, there is not an overplus of good apples. The " overplus," is of poor fruit. Sometimes a lack of proper distribution causes an overplus in some one place; but, during the last three years, we have had good, profitable prices, and the outlook, to me, for good prices, is still better. The German and southern markets is now opening up, and the rates of transportation are lower. Beside that, there is a constant increase in the insect pests, which will drive out many fruit-growers, who will not be thorough in fighting the pests. But the presence of the pear-tree psylla, San José scale, scab, fungus and blight, will so demoralize some growers as to cause them to let their orchards go, and those who persist to the end will reap good profits for their investment and work. Certainly, I would if I wanted them, set pear trees now.

What is the best preventive of borers in fruit trees?

A Farmer.—Dig them out with a wire.

Dr. Smead.—A bandage of wire gauze put around a tree will keep them out. It should extend down under the surface of the soil a trifle.

What is the present outlook for apple-growing?

C. M. Hooker.—It is at present very encouraging. Three years of remunerative prices, with fairly good crops, make the outlook much better. Western New-York apples rank best everywhere. We are learning every year how better to grow apples and how to fight insects and fungus. Of varieties he said he has found the old ones still the best, although he, at his age, would not plant Baldwins; a young man should, however. Ben Davis is also a good commercial variety.

Mr. Wood.—I now have great confidence in the apple. It is the king of all our native fruits and has saved my life financially. Roxbury Russet with me is all right, so is the old black Gilliflower.

A gentleman from Oswego said that several buyers of apples were in his place last fall and paid fifty cents more per barrel for Gilliflower than for any other variety in the market. It is rapidly coming to the front as a market apple.

Prof. Van Deman.—Western New York is the great apple-growing belt of the State and is going to grow millions and millions of barrels of the fruit in the future, and so the question of the most profitable varieties ought to be considered. To-day, Ben Davis is the business apple for our markets. People may talk about Ben Davis just as they have done and do about the Kieffer pear, but, so long as these fruits sell at good prices, and the people demand them, we should grow them. If I were going to plant an orchard to-day, I would put in a row or two of Ben Davis, or, if I were to grow trees on which to top-work other sorts, I would plant Ben Davis. I would top-work Baldwin and King of Tompkins County on it, also Grimes' Golden. The latter is to-day the best apple in America. Its season ranges from November to New Year, but York Imperial is running an even race from Virginia to the Pacific coast with Ben Davis, and you will find that, within the next twenty years, it will have become a great favorite in your orchards here. Its only fault is its ill-shape, but that does not influence its quality at all. It ripens with Baldwin or even later. It keeps better and holds its fine flavor to the end.

If you were to set a commercial orchard, near Altamont, what varieties would you plant?

Mr. Van Alstyne.—One should be governed by soil, climate and markets. Some varieties do better on heavy soils than do others. For myself, I prefer a majority of fall varieties, Duchess, Maiden's Blush and Gravenstein are among the best for me. I also grow Red Astrachan, which is very early, and I have got more money from it during the last ten years than from any other variety I grow. Years ago I came very near top-grafting all my Astrachans to some other variety. I am now very glad I did not. Yellow Transparent is a beautiful early apple of fine flavor, and the tree is an upright grower, hardy in foliage and wood, and an early bearer, but I think the skin is too tender for a shipper. The Greening, Ben Davis, Sutton Beauty and Hubbardston are among the best winter sorts. King of Tompkins County is one of the very best winter sorts, but its root growth is deficient, so I would top work it on the Spy. Ben Davis is of poor quality but it is a fine grower, an early bearer, and is much sought after in our markets as well as in those over the water. So I grow it for the money in it, not for sentiment.

In setting an orchard, are not young, straight trees better than those two or more years old? What about pedigree trees?

Mr. Van Alstyne.—I would want straight trees, and ordinarily I think that two-year old trees are preferable, although there is no particular objection against one-year olds. So far as pedigree is concerned I am a firm believer in that. They should be propagated from buds or scions from good, strong, healthy trees, with a good root system, and which bear fruit of the most perfect type. We often find a very marked difference in the shape, color and flavor of the same variety of fruit, made so by propagating the trees from inferior stock, those which had drifted away from the original type.

What is the benefit of applying salt to quince bushes? When, how and in what quantities should it be applied?

Mr. Van Alstyne.—The quince, like the cabbage, likes salt, and I think the same is true of asparagus. Salt also creates moisture, but I would use it in moderate quantities about the quince tree. I would put a quart, scattered about the trees as far as the roots extend. On very large quince trees, perhaps more may be used, but I would not apply it oftener than once in two or three years, and it will be found best on light soils.

Should we trim our pear trees the same as we do our apple trees?

Mr. Fenner.—No, sir. I have several hundred pear trees, and prune them but very little. Sometimes I cut out some of the inside branches that interlock. Pears ought not to have too much sunlight. They should be grown in the shade, then picked before they are thoroughly ripe, and left to ripen in the fruit house or cellar.

What is the best tool with which to cultivate the orchard? How about the disc harrow?

Mr. Smallwood.—I cultivate the orchard the same as I do any other field, with the spring-tooth harrow.

Mr. Cook.—We use a heavy disc harrow in place of the spring-tooth, so that quack roots will not be dragged all over the field. The harrow is heavily weighted and four horses hitched to it. You don't want a light disc harrow, but a heavy one, that will chop up all quack or other roots. Remember, quack roots make just as good humus as do any other plants; but I can kill it dead as a hammer, every time, in the way I say, first having sown a crop of oats and peas thickly, followed by one of winter wheat, seeding with clover the next spring.

How many times is it necessary to spray one orchard?

A Farmer.—Spray twice; once before the blossoms open and once after they fall, using the copperas sulphate and lime. It is what is known as the Bordeaux. Add paris green with the Bordeaux for the last spraying.

Why are Ben Davis apples such good sellers?

Mr. Gould.—Because they are red; I know of no other reason.

Mr. Cook.—They will bear some hammering, and, after all, are a very good apple. In the spring when all other varieties are gone, it does very well; the evaporator men like it because it makes a white product that is attractive in the market.

Would rape be a good crop to sow in an orchard?

Dr. Jordan.—Yes, sir. Rape would be a good crop for that purpose. Dwarf Essex is the best variety I know of. But if you sow it, fertilize both the trees and the rape, else the rape will steal fertility as well as moisture from the trees. Rape, like cabbage, requires considerable nitrogen to perfect a good crop. Do not allow it to take it from the soil at the expense of the trees.

How far apart would it be best to set peach trees here at Weedsport?

Mr. Cook.—I don't know. No one of us are peach-growers.

A Farmer.—I think it best to set them from sixteen to twenty feet apart each way.

What strawberry is best to fertilize the Bubach?

Mr. Rice.—I don't think I could answer that question for you, because strawberries are fickle. With us, however, Brandywine is best for the purpose, because both varieties blossom and ripen about the same time, are about the same size and variety, and both are good sellers. We can't get too much pollen by way of fertilization for Bubach.

A Farmer.—Brandywine, Bubach and Gandy are the best sorts here.

What new varieties are best?

Mr. Rice.—William Belt, Glen Mary, Atlantic and Marshall are all on trial with us. Marshall is one of the most beautiful strawberries I ever saw, and one of the best in growth, but there is so much difference in soils and climates that one cannot advise. We find that many things that do well with us do not elsewhere, only a few miles away.

Is it best to mulch strawberries till after freezing, before cultivation? Is horse manure suitable for mulching?

Mr. Talman.—I would say by all means mulch them, using wheat straw, and leave most of it on the plant, taking off just enough so that the plants will come up through it. I would not use horse manure at all.

Mr. Converse.—I have tried mulching to be left on, but I now greatly prefer cultivation to keep down the weeds and conserve moisture. I also find that it is more profitable to take off but one crop of berries from a bed, then plow it under. If a second crop is taken off, the berries are much smaller and the yield less. We mulch the new bed, or, rather, cover it in the fall with marsh hay or straw, to be raked off in the spring.

What kind of fertilizer is best for fruit trees?

Mr. Converse.—I am not an orchardist, but I have noticed in Western New York that the best orchards were those that are cultivated. Oft times that is all an orchard needs. If the trees are thrifty and are making a good growth they do not need nitrogen, and in most soils there is potash enough. If any fertilizer is required, it is phosphoric acid.

What is the average production of strawberries on well-cared-for land, per acre?

Mr. Converse.—One hundred bushels, or, say, 3,000 quarts, is a good, fair yield.

Can you give any remedy for the strawberry root louse?

Mr. Chapman.—The only remedy is to plow up the bed. I have not had it on my grounds, but have seen it in the State of Delaware. That is the remedy down there.

What is the difference in effect on the apple tree in trimming in April and October, when it is quite severe in both cases?

Mr. Converse.—I suppose that if we are to trim severely, the nearer we can do it to a full flow of sap, the better. But I have heard Mr. Willard say that it is better to trim when the tree is at rest. It were well, however, to trim a little each year, so as not to have to cut off large limbs, and all trimming should be done closely. Do not leave the "stubs" sticking out far enough to hang hogs on when butchering day comes. When they are cut closely, if the wounds are painted over, they will soon heal.

Last year our orchard in this vicinity was treated as follows: Buckwheat was sown early and plowed under, then sown again and the crop taken off. It is proposed to plant to corn. Is it right?

Mr. Van Alstyne.—I question if it is the best plan for the orchard. It may be best for the other purposes mentioned, but we want to get the most out of the orchard we can. So we ought not to grow any crops that will take away fertility or moisture from the tree. If we are to do that, we must feed both the trees and the crop sufficiently, and I know of no better crop to grow in the orchard than corn, because we can give both the crop and the trees cultivation.

FERTILIZERS AND FERTILIZING.

Why does land plaster fail to benefit our meadows, as it formerly did?

Mr. Woodward.—As I understand it, land plaster is only a stimulant, and, after the soil has been stimulated to a certain extent, such stimulants fail to act.

Mr. Cook.—I would not draw land plaster from my depot, if it were given to me. I would buy South Carolina rock, instead. It costs but $11 per ton, and there are in it 240 pounds of phosphoric acid, worth five cents a pound, in a ton of it, thus giving us the plaster, or sulphate of lime, practically free. There will be about 1,200 pounds of plaster.

Is it economy to top-dress new meadows with barn or stable manure?

A Farmer.—I top-dress my meadows. Have meadows from which I get a ton and a half of hay from an acre, and they have been mown continuously twelve years.

Which is the best way to use nitrate of soda in a garden? How much will it require for the plants if placed around the roots?

Mr. Cook.—I would not care to say how much will be required to injure the roots, but I know that it will injure the foliage of some plants. So I would not use but little at a time, say fifty to seventy-five pounds to the acre; but I would not use it when the foliage is wet. Wait till it is dry, then apply it close to the plants.

Mr. Dawley.—Mix your nitrate with plaster or earth, before applying.

What fertilizer is best for spinach, lettuce and celery, when one does not have stable manure?

Mr. Cook.—I do not grow these vegetables, except for family use, but I have learned that we must fertilize a crop according to its needs. Lettuce is a plant that requires much nitrogen. If enough is given, it will be tender; but there may be enough nitrogen in the soil now; that is, as much as the plant can assimilate. Therefore, it would be money thrown away to add more of this element. As a rule, there is potash enough in the soil for most crops. Phosphoric acid is usually most needed. You will get it best from South-Carolina rock. If you need more nitrogen for the crops you mention, I think that the best source will be nitrate of soda. It gives the plant an early, quick start. But, no matter what crops or plants we grow, best results are obtained from fertilizers when there is a good per cent. of humus—vegetable mold—in the soil. To know just what fertilizer is best, we must study the habits of the crop to know what it needs, then strive to provide it.

Hen manure 4 parts, fine stable manure 2 parts, wood ashes 1 part, mixed thoroughly and rotted—on what crop and how would you apply it?

Mr. Cook.—I would not make such a mixture. Leave out the ashes, as they would unlock and release all the nitrogen in the manure. Put in some South-Carolina rock and potash, then apply it at once. I believe that the ideal way to apply manure is in the fall, if one can save it all until that time; but we draw ours all out and apply it as fast as made, usually putting it on sod where we are to plant corn.

Mr. Terry.—I believe that Mr. Cook is right. We store all of our manure under a shed, and keep it wet so that there will be no loss of nitrogen by fire-fang; then draw it out and put it on our sod, in the fall. We drew out 350 loads last fall.

A Farmer.—Why not put it on the wheat?

Mr. Terry.—It would not do at all. There would be so much nitrogen in it that the wheat would all fall down; but, when it is put on the clover and the clover is cut early, it does no harm, and we get its full benefit in our potato crop next year.

Does it pay to buy manure to bring up the land?

Mr. Terry.—It would depend on the quality, what it cost and how far one would have to draw it. If I had to pay fifty cents a load for ordinary manure and draw it half a mile, I would not touch it. Too much of it, from livery stables, becomes fire-fanged, thus leaving nothing but potash and phosphoric acid in it, worth four cents a pound. If manure is made on a cement floor and all—urine included—saved, and it is directly applied to the land, it will pay to buy it and haul it a short distance, at a reasonable price. A load of such manure weighing 3,000 pounds, drawn two miles, will pay at $1.

Are wood ashes good for a clay soil? Are Canada ashes pure?

Prof. Cavanaugh.—I guess that it will be found that wood ashes are good anywhere. On clay, ashes are valuable, because they contain from 30 to 50 per cent. of lime. Good ashes will analyze four or more per cent. potash, with one per cent. phosphoric acid. But I would not buy them except on a guaranteed analysis. I think they would be most valuable on a heavy clay soil. They are worth what the potash shows up. The phosphoric acid in wood ashes runs from one to one-and-a-half per cent., but it is not all at once available for the use of the plant.

Mr. Litchard.—I buy all the wood ashes I can find; they are the best fertilizer I can obtain for my potato ground.

What per cent. of potash is there in average hardwood ashes?

Mr. Cook.—They will not average more than about four per cent. when dry and unleached. Sometimes we find a higher per cent., then a lower one, but there is a little phosphoric acid in them, possibly one and one-half per cent. The remainder consists of about forty per cent. of lime and foreign matter, so that, on sour soils, ashes have an additional value in this direction. On soils that are not sour their only value is in their potash and the small per cent. of phosphoric acid, which is slowly available.

How do hardwood ashes compare with fertilizers for oats and buckwheat, when unleached?

Dr. Van Slyke.—We cannot compare them. Ashes contain but one element—potash. Buckwheat requires a fertilizer containing other elements. Ashes at $6 per ton, containing four per cent. of potash, would not be too dear. At $10 per ton, unless one wanted lime, the cost would be too high. It were better to buy muriate or sulphate of potash for the crops named.

What harm in putting wood ashes in the drops behind the cows in the stables?

Mr. Van Alstyne.—The potash in the ashes liberates the nitrogen in the manure and allows it to escape in the form of ammonia, which is just the thing we want to save. Lime has the same effect when mixed with manure. If ashes are to be used with manure, the mixture should be applied to the soil and plowed under at once. It were better to use South-Carolina rock in the gutters, to absorb the liquids, as there will also be added a good per cent. of phosphoric acid, an element that barn manure usually lacks.

A Farmer.—Good wood ashes have proved the best fertilizer I ever bought. They have been worth at least $1 per bushel to me, but they only cost me ten cents.

Which is the cheaper to buy, manure at three or four shillings a load, or commercial fertilizers?

Mr. Converse.—There is a difference in the value of manure, and there is in that of fertilizers, but, at such prices for manure, compared with those for average commercial fertilizers, I would buy the manure.

What is the best fertilizer for clay soils?

Mr. Cook.—As a rule, clay soil has potash enough. What is most needed is the liberation of the plant food now in it, rather than to add any more. It will be a waste of money to add plant food, unless the soil has humus. There are thousands of acres of sandy soils in this country that are full of plant food, but which is not available, for the reason that there is no humus in them. To tell what elements of plant food are needed on such clay soils one would have to watch the crops, note results and then feed the plants just what they should have.

Does it pay to let manure stay out all winter in the barn yard, when the land needs it?

Mr. Van Alstyne.—No, but we see it every day on some farms; at the same time the owners are going out and buying commercial fertilizers. This class of farmers are those who are all the time howling about their taxes, but they never stop to think that they are losing six times as much every year through the loss of their manure and the injury done to their farming tools left out of doors the year round.

With cow manure at $1 per ton, what per cent. of liquids should be credited? How can it be saved?

Mr. Converse.—I would make the floors and gutters of cement, then use absorbents in the gutters to hold the liquids. They contain sixty per cent. of the value of the voidings of the animals. Straw, horse manure, land plaster and other absorbents should be used for this purpose.

Where is the best place to buy Carolina rock? What are the prices?

Mr. Cook.—I buy it for $11 per ton, from first hands.

Mr. Fenner.—It is $14 with us. Prices seemed to vary according to localities and markets. Some is more available and has more acid in it than has others. There are several features about South-Carolina rock, and, all things considered, I believe it best to use the dissolved rock in the cow stables, behind the cows. There are from 240 to 280 pounds of phosphoric acid in a ton of the rock, with about 1,100 pounds of gypsum.

A Farmer.—We buy pure plaster here for $3.50 per ton.

What form of potash shall I buy, kainit, muriate or sulphate, for tobacco?

Mr. Cook.—Sulphate is, as a rule, worth from $8 to $10 per ton more than is the muriate. I cannot now give prices. The difference in price is in the less amount of salt in the sulphate. There is no salt in that while there is in the muriate. I don't know about kainit.

To Mr. Cook.—What per cent. of actual potash is there in muriate?

Answer.—If you buy genuine muriate of potash, in sacks just as it comes from Germany, without being opened. you will get 1,000 pounds of potash in a ton. It is the same with sulphate, but the latter costs $10 a ton more, because it has been treated with acid and the chlorine and lime removed. But I do not believe you can afford to go into the market and buy a commercial fertilizer. We can't do it in Lewis county. The first part of the question I cannot answer.

How much phosphoric acid will we get in a ton of treated South-Carolina rock?

Mr. Cook.—You will get 250 pounds of acid and 1,200 pounds of pure plaster in a ton, thus giving you the latter practically free. Save your manure. Do not buy nitrogen. If you do, buy it in nitrate of soda, dried blood or cotton seed meal.

Does it pay to plow under corn, for manure?

Mr. Terry.—There would be no fertility added; all the benefit would be in the humus, and I would much prefer rye to corn for that purpose, although that would add no nitrogen, as would clover, but it would be preferable, while clover is much better than is the rye.

Will the use of muck give humus to the soil, and can it furnish any fertilizing element?

Mr. Van Alstyne.—Muck is largely composed of decayed vegetable matter and will give us humus. There is some fertilizing value in some muck; in others not any. But it is a very good absorbent in the stables, especially in the hog pens.

In taking manure from the stable, is it best to spread it, or leave it in piles?

Mr. Converse.—Experiments go to show that in no way can there be as much value got out of manure as to draw it out as fast as it is made and spread it where it is to be used. There will be none or but little loss in disposing of it in this way.

Mr. Smith.—There is no time when there is so much fertility in manure as when it is first made and no time when it can be handled so cheaply. There can be no loss of mineral matter except it is washed off, nor can there be any loss of nitrogen unless the temperature is raised to at least seventy degrees.

A Farmer.—I draw my manure out every day.

Mr. Cook.—I do not believe, all things considered, that there is any better time to draw out manure than the day it is made. Possibly, if it were kept till it rotted and no loss of nitrogen were allowed, it would be worth more, but the cost of caring for it would more than overbalance that item. There will be no loss of the mineral element in manure drawn out and so spread, nor none of nitrogen unless fermentation sets in, which can not take place unless the temperature gets pretty high. When you see the smoke rising from a manure heap you may know that it is nitrogen—worth fourteen cents per pound.

Mr. Hardy.—Draw it out every day it is made, and spread it. It will never be as valuable again. The loss is absolutely less when it is so disposed of than in any other way.

Would you advise putting manure on the snow on winter wheat?

A Farmer.—Draw it out and spread it on every day. Nothing will be lost from such disposal.

Which is better, to store manure in a pit or cellar until fall or draw it out and spread on the land while fresh?

Mr. Van Alstyne.—I think it much better to draw it out as fast as made, liquids and all, and spread it where it will be wanted. I would not spread it on steep hill sides, especially if they were icy, as it would wash off. Manure cellars are too expensive. Beside that, the manure, when placed in them, has to be handled twice; another expense.

Mr. Ward.—Manure drawn out as fast as made and spread on the ground will not get away, even when the ground is frozen, except it were on an icy hillside.

Dr. Van Slyke.—As a rule, nitrogen in such manure does not get away. There must be a temperature of about seventy degrees to affect nitrogen so as to change it into a soluble form. But there can be but little, if any, loss from phosphoric acid or potash, they being minerals. But in some instances there may be a slight loss from these sources. There is a little coloring matter in manure which we sometimes see running away, and which appeals to the eye, but there is no value in it, so far as known. As a rule, manure that has been properly saved and partially rotted has a little more value than green manure.

Mr. Fenner.—I heard Prof. Roberts say that they had analyzed the coloring matter that is sometimes seen running away. It is of no value, it being tannin. There was no effect from it seen three feet from the piles of manure where they were left in the field.

Mr. Ward.—There may be a slight loss from manure when drawn out and spread in winter, at times, but the saving or expense in handling the manure as fast as made will offset any loss from leakage or otherwise.

Which would you buy for phosphoric acid, South-Carolina rock or bone?

Mr. Van Alstyne.—There is no difference in the value of the acid, but there is some nitrogen—about one and one-half per cent.—but the difference in price between rock and bone is too much to balance the item. I do not think I got any, or but very little benefit from bone.

Upon what crop should we use our manure on our hard-pan land?

Mr. Converse.—I would, if I kept cows, put it on to a good sod, then plow it and put in corn for the silo. But I would save all the manure, by which I mean liquids as well as solids. Sixty per cent. of the value of the manure is in the liquids. So I would use absorbents in the stables, then draw the manure out as rapidly as made and apply it to the land on which I wanted to grow corn.

Should we, as a rule, use a fertilizer to compare with the crop we are growing, if we do not know the analysis of the soil?

Dr. Jordan.—At the prices which rule in the market, I will say no. No farmer can afford to do it. Find out something about your soil yourself by experiment. No chemist can tell what the soil needs. He may tell how much fertility there is in the soil, but he cannot tell what is or is not available. Cornell is sending out samples of different formulated fertilizer and asking the farmers to try them and report. The farmer must study the thing himself. No scientist or farmer, however well read or posted, can make rules for his neighbor. As a rule, however, I will recommend an application of phosphoric acid. We have acid enough. You cannot afford to buy potash now, because, 100 years hence the land may be short of it. Heavy soils have more potash than light ones, but the farmer must find out for himself. I wish that the chemist could take a sample of every soil, analyze it and tell just what the owner needed, but he does not yet know how to do it. Possibly in the far-off future he may be able to tell, but I doubt it.

A farmer present said he had harvested a larger crop of barley on land fertilized heavily with phosphoric acid, while another said he got no results from such on oats.

Dr. Jordan.—You are just adding testimony to what I have said. It all depends on the soil's need. Both of you gentlemen are on the road to righteousness. Keep right along with your experiments. I can't help you.

What is a complete fertilizer?

Dr. Jordan.—A complete fertilizer is known as one containing a greater or lesser per cent. of nitrogen, phosphoric acid and potash. An incomplete fertilizer does not contain all three, but one may use such a fertilizer on his soil that would act as a complete one, because the soil already contained the deficient element.

What is the best and at the same time the cheapest fertilizer for the farms of this section (Schenevus)?

Mr. Van Alstyne.—The best fertilizer is good barn manure, that is, that which contains the liquids as well as solids. Next comes clover with some of the green crops plowed under. When we have exhausted all our farm sources, we may buy commercial fertilizers. But I would buy the ingredients, take them home and mix them myself. Don't buy them mixed, nor be governed by the smell. Know what the analysis is of each element, and see to it that it is guaranteed. If you want nitrogen get it in the form of nitrate of soda, dried blood or cotton seed meal; if potash is required, buy the muriate; if phosphoric acid, buy dissolved South-Carolina rock. These sources will give you the needed percentages and in an available form.

How best improve a worn-out sandy soil?

Mr. Van Alstyne.—The question refers to a light soil devoid of humus. That must be present to hold moisture to get a crop. Cultivation will do it in part, but I incline to the belief that a crop of cow peas sown in June and plowed under the next spring would be a good crop. "Whipporwill" or "Clay" are the best of perhaps 20 varieties. If I did not sow the cow pea, I would try winter rye to plow under. So far as fertilizers are concerned I do not think I would buy nitrogen. If I did it would be in the form of dried blood. If I wanted potash I would buy the muriate; if phosphoric acid, I would buy dissolved South-Carolina rock; if I found the soil acid I would apply 20 bushels of slaked lime, broadcasted, per acre, to correct the acidity.

Mr. Cook.—I think that the best way would be to put on a herd of dairy cows.

What is the relation, that is, manurial value, of oats, corn, wheat bran, or wheat middlings, if either of them be fed to live-stock?

Mr. Cook.—If the voidings are all saved, there will be found most manurial value in the bran, next in the oats. There is more value in the manure made from nitrogenous than from carbonaceous foods. Corn is of the latter class, and its manurial element is quite low compared with bran. The same is true of timothy hay when compared with clover. Corn, timothy hay, the straws, cornstalks and corn ensilage are all starchy foods, and so contain but very little manurial value, while clover, wheat bran, wheat and buckwheat middlings, gluten meal, oil meal and cotton-seed meal are all nitrogenous and have nearly as much manurial as feeding value in them. Peas belong to the same class. Next, perhaps, come the oats.

What crops do you recommend as best to plow under to furnish nitrogen and humus, and what element of plant food would you apply if you did not have manure enough? Would you buy plaster?

Mr. Cook.—I would plow under clover or cow peas. Both are nitrogen-catchers from the atmosphere, which they give up to the soil, and both furnish humus, but put in the peas as soon as all danger of late spring frosts is past, and plow them under before the early autumn frosts come. You will have to watch out for these, as the cow pea, which is a bean, not a pea, is very tender, and the first autumn frost breath cuts it down. As a rule, on most soils, for most crops, phosphoric acid is most needed. There is potash enough, as well as nitrogen, for most crops, so I would buy South-Carolina dissolved rock to get that element of plant food. I would not draw common plaster from our depot if it were given to me. The dissolved rock may be bought for just about the value of the phosphoric acid in it. There will be about 250 pounds of the acid and 1,200 pounds of plaster in a ton of it. Don't buy land plaster. It is no longer of any value on most soils. Buy the dissolved rock instead.

What is the best fertilizer for the strawberry?

Mr. Gould.—A good lot of stable manure applied in the fall; have it well rotted, then follow it with a good application of South-Carolina rock. The strawberry requires phosphoric acid, in excess of some other fruits.

What about Canada hardwood ashes?

Mr. Cook.—If you buy them, do it on a guaranteed analysis. There is a whole lot of such ashes sold that never saw Canada, and many of them are not worth half what they cost. As a rule, they do not contain more than 4 per cent. potash, so that $6 per ton is enough for them. There is about 40 per cent. lime in them, which, if your soil is sour, will sweeten it.

What is the best fertilizer for gardens?

Mr. Smith.—Good barn manure, with, perhaps, South-Carolina rock and nitrate of potash, would be best.

How should hen manure be treated and how used to get the most from it?

Mr. Cook.—Mix South-Carolina rock or land plaster. I prefer the former, because it contains phosphoric acid. The gypsum or land plaster in it will absorb and hold the nitrogen in the droppings. Road dust, if one cannot get anything better, does very well to dry the droppings, but I do not think it as good as the gypsum. Do not mix wood ashes with the droppings as the potash in them will drive out the nitrogen in the droppings. Broadcast and harrow them in.

Is salt beneficial to land, if so, in what quantities?

Prof. Cavanaugh.—Salt may be a benefit to a soil, although it contains no plant food. Its benefit consists in liberating plant food locked in the soil. The same is true of lime, plaster and perhaps some other substances. When we apply lime, plaster or salt, the potash may be liberated and thus made available for the use of the plant. When I was a student in college, we sometimes, when the oil got low in a lamp, poured in water. It raised the oil so that it came in contact with the wick and helped us out. But, after we use such substances a while, they seem to lose their effect. So far as the quantity of salt to be used is concerned, I could not advise. I do not think I would apply more than 400 or 500 pounds per acre, however.

Is muck of any value as a fertilizer, when in its original state?

Prof. Cavanaugh.—There is a difference in the value of muck. As a rule, its value consists mostly in its humus. Usually a muck soil is sour, and produces best results when lime or wood ashes have been applied to sweeten it.

To Mr Cook.—What is the best fertilizer for all crops?

Answer.—Good barn manure first, for any crop, but save it all. Use absorbents in the gutters behind the cows, to hold all the urine. Dissolved South-Carolina rock is the best, because it furnishes the gypsum, or what we know as land plaster, and furnishes phosphoric acid, beside.

Do you advise the using of any form of commercial fertilizer for corn, if you have barn manure enough?

Answer.—I think it pays to use a little nitrate of soda, say 50 pounds, mixed with 150 or 200 pounds of South-Carolina rock, about 200 pounds per acre, and apply it in the hill to give the plants a quick start. If one were using 400 or 500 pounds, it should be broadcasted, else the plants would be burned by the nitrate of soda. Use a small quantity, just to start the plants rapidly, putting the mixture in the corn hills.

What is plant food? How shall we cause our exhausted fields to become fertile?

Mr. Van Alstyne.—There are several elements of plant food, but there are but three that are of vital importance—nitrogen.

phosphoric acid and potash. A soil may be deficient in one or all of these elements, but one may tell which is most lacking. If the plant is feeble in growth and the foliage pale, nitrogen is needed; if the foliage is strong and the straw weak and falls down, there is too much nitrogen. If the plant fails to mature it lacks potash. If it does mature and does not mature seed or fruit, phosphoric acid is required. But a plant may mature satisfactorily in one field and farm and fail on another. And there may be latent plant food enough in the soil which humus and cultivation would set free. All plants take their food in liquid form, which to get, there must be moisture in the soil. As a rule, here, our soils are deficient in humus, or what is better known as vegetable mold. Barn manure and the plowing under of clover, rye, the Canada pea and the southern cow pea will furnish this humus most readily.

Would it pay to sow ammoniated fertilizers to increase the per cent. of spirit food in the soil?

Mr. Cook.—I don't know whether it would or not; as a rule, to buy commercial fertilizer in the market as they are sold, for the crops you and I grow, it will not pay. If, however, there is a deficiency of nitrogen in the soil, I would recommend some nitrate of soda, or dried blood or cotton-seed meal. There is not much difference between the price of the last two, which is not far from $20 per ton, while the nitrate will cost about $40. If phosphoric acid in the soil is required, I would recommend South-Carolina rock, instead of ground bone. The rock will contain from 12 to 14 per cent. of available phosphoric acid. As a rule, we have an abundance of potash in our soils, especially in our clay soils.

So, if I were going to buy plant food, I would buy the rock. If I wanted potash, except I were growing tobacco, I would buy muriate. Muriate contains some salt, sulphate does not. The muriate costs about $40 per ton, sulphate $10 more. Years ago our farmers used to buy land plaster, and they may now, but I would not draw it from the station if it were given me, because I can buy dissolved rock, get the phosphoric acid at market prices, and have the plaster free.

How can we get most value from manure?

Mr. Cook.—I don't know. It would depend on how the manure was kept, as a rule. According to the Cornell analysis, newly-made manures, urine included, is worth from $2 to $2.60 per ton. We have not been able, so far, to compost manure without loss; so we draw ours out every day it is made, and spread it where it will be wanted. There will be no loss, except it is washed off the ground. The potash and phosphoric acid cannot be evaporated, and, unless the manure heats up, there will be no loss of nitrogen. If one can save his manure so as not to have it heat, it may be most profitable to store it, but it will be found hard to do it.

What is the best method of keeping up and increasing fertility, and what crops do you recommend as best for the purpose, on farms run for all purposes?

Mr. Van Alstyne.—The first and best method of keeping up fertility will be found in keeping farm animals. Grow crops to feed the animals, then save and apply the manure from them. The best crop to raise is the manure crop; but it should all be saved. This means the liquids as well as the solids. Sixty per cent. of the value of the voidings is in the urine, and that is the portion that, as a rule, is usually lost. To-day, with the same number of cows I kept twenty years ago, I am making at least twice as much manure as I did then, while its value is fully doubled.

Years ago the cows were milked in the yard and allowed to run out, while the stable floors were leaky. To-day the floors are tight, with water-tight gutters behind the cows. Into these gutters we put horse manure, road dust, or land plaster, to absorb the urine. As a result, I manured well eight acres of land last fall from the manure removed from the gutters during the summer, which, under the old way, would have been dropped in the barnyard and not drawn out till the next year, when the urine would have all been lost and much of the nitrogen in the solids.

Would it be advisable to use hen manure as a fertilizer on land intended for strawberries?

Mr. Converse.—All the hen manure made on our farm goes on to the strawberries. There is no better manure. If, however, I wanted to make a "quick start" of the plants, I would apply a little nitrate of soda, being careful not to allow any of it to come in contact with the leaves, else it will burn them.

Mr. Chapman.—One should be careful in applying nitrate of soda to strawberries. Do not apply too much, else it will so stimulate the plants that it will set too many blossoms which will develop a crop of small berries. Nitrate of soda, if it comes in contact with the leaves, however, will not injure them unless they are wet.

What is the mercantile value of a fertilizer containing 14 per cent. of acid phosphate soluble in water?

Mr. Cook.—That is no more or less than dissolved South-Carolina rock, which, I understand, is now worth about $14 per ton. I have several tons which I bought awhile ago for $11, but since then all fertilizer chemicals have gone up in price. The usual phosphoric acid has a tendency to set free potash in a certain degree in the soil, now unavailable.

How are we to get the manure on to our steep hillsides?

Mr. Cook.—If your buildings are below the hill I know of no way to get the manure on to the hills, except by drawing it there.

Would not the continued use of phosphoric acid tend to decrease that of nitrogen and potash in the soil?

Answer.—Possibly, but I would continue using it as long as benefits were derived.

Is it best to top-dress the meadows with manure from the stable or use it on cultivated ground?

Mr. Ward.—Put it out on the corn ground. What that crop does not take up, will be left for the oats or other grain crops that are to follow, or for the meadow later on.

Would you use plaster in your stables for an absorbent?

Mr. Cook.—No; I would not draw it home if it were given to me. It will absorb, but I prefer dissolved South-Carolina rock. There are about 280 pounds of phosphoric acid in a ton of it, and one-half of the remainder is pure plaster; so we get the plaster, practically free.

Mr. Dawley.—If you don't feel like using the "rock," use plaster or some absorbent by all means, the loss of liquid manure is one of the greatest leaks on our farms.

What is the value of a fertilizer, 14 per cent. acid, but only 12 per cent. soluble?

Mr. Cook.—I don't know. I told you what it costs, whether you can get your money out of it, is a question. But, no doubt, the ideal way to use it is in the stable as an absorbent. The phosphoric acid is an element in which, as a rule, barn manure is lacking. Twelve per cent. is worth a little less than the 14 per cent. fertilizer.

Where can South-Carolina rock be procured? What is the price? In what shape does it come, in bulk or in sacks?

Mr. Cook.—I have been told that the fertilizer men, or most of them, have formed a trust and refuse to sell chemicals to outside parties. Prof. Jordan of the Geneva Experiment Station, is looking up the names of these commercial fertilizer men who refuse to sell chemicals to farmers, and will publish their names in a bulletin. The price of South-Carolina rock has advanced somewhat recently. I think it is not far from $14 per ton.

Is there any difference in the phosphoric acid in ground bone, boneblack or South-Carolina rock?

Mr. Cook.—No; phosphoric acid is the same wherever found, but it may not be just as available in some forms as in others. The men who sell bone phosphate ask higher prices for it than do the dealers in the rock, because there is a little nitrogen in it, but the difference in the price of the two is too much. So, then, buy the rock.

Are not the fertilizer men refusing to sell chemicals to farmers for home mixing? If so, where is one going to obtain them?

Prof. Van Deman.—The German Kali Works do not sell fertilizers but potash salts and will sell to any one who wants potash, whether he be farmer or fertilizer manufacturer.

The professor mentioned other dealers who sell only chemicals or ingredients to any one ordering them.

What is the reason that land plaster does not produce as good effect on our land as it did forty or fifty years ago?

Mr. Van Alstyne.—Land plaster does not contain any plant food direct. It is largely sulphate of lime—its office being to develop moisture. The probabilities are that the soil being deficient in humus, it cannot develop moisture so that the soil can hold it. Years ago, when we saw an effect on soil, there was plenty of vegetable matter in it. Now, there is but little, hence it does not have the effect it did then.

How would you raise a selling crop from a field well supplied with plant food year after year without manure or fertilizer?

Mr. Van Alstyne.—If the field is well supplied with fertility there will be no need of adding any more. I know of no better way than to supply humus. There must be a deficiency of that, else there would be moisture enough without cultivation to grow a crop, provided the fertility in the soil were of the right distribution. If we have such fertility we must use the clovers or other green crops to supply vegetable matter. There is no such thing as an exhausted soil. Those which have been so catalogued have been found to contain an abundance of fertility. All that was needed was proper treatment. By adding a little potash and South-Carolina rock, and; perhaps, some nitrate of soda, to give the plant a start, with the humus and cultivation, such a soil may be brought up and good crops grown yearly.

What becomes of funds received from tax?

Prof. Jordan.—The revenue from these license fees is to be used in paying the expenses of inspection, including the salaries of chemists, the salary and traveling expenses of our traveling agents, the cost of gas and chemicals and the expense of printing the necessary bulletins.

What reason is there for taxing commercial fertilizers?

Prof. Jordan.—We adopt the license fee system in this State because it seems to be the only practicable way of adjusting the amounts of money available to the extent of inspection work to be done. We have simply put ourselves in line with all other States, with possibly one exception. Experience seems to indicate that this is the most satisfactory way of accomplishing the results. It is a large question and I will not argue it fully.

What is the tax on commercial fertilizers in New York? Does it increase cost to consumer?

Prof. Jordan.—The tax on commercial fertilizers in the State of New York will probably amount to about $10,000 for the year 1900. The rate is $20 per brand. As probably not less than 1,500,000 tons are sold in the State annually, the tax per ton is about two-thirds of one cent. I know from conversation with fertilizer men that they are utterly indifferent to the amount of this tax.

SILOES AND ENSILAGE.

What form of silo do you recommend?

Mr. Cook.—The round one. We have several square ones, but will build two round ones the coming summer.

Why do you prefer round to square ones?

Mr. Cook.—The round silo is more cheaply built, is as fully frost-proof, and there is not much loss of ensilage for the reason that there are no corners in which the ensilage can spoil by molding.

How will your siloes be constructed, and what will be the material?

Mr. Cook.—They will be round. The material will be pine. The staves will be six inches wide and three inches thick. They will be planed on both sides, brought to a uniform thickness, grooved and tongued on a bevel to fit the circle of the silo, put together with white lead and oil and hooped with five-eighth inch round iron. Such a form of silo is preferable to the square one, because, as I said, there are no corners in it where the ensilage can spoil, nor is the lateral pressure so great; but, if you are going to build a round silo, do not put a square roof on it. Have the roof round. It will not cost any more than does a square one, while its appearance will be much better.

Why not use the Page wire fence for hoops for a silo?

Mr. Cook.—I don't know. It is said that the fence makes good hoops, and some of our silo men are recommending it, but I am in doubt about it, so I shall use the round iron hoops.

Which is the better way to plant ensilage corn, in drills one way or in check rows in hills?

Mr. Cook.—We have practiced both ways. There is not much difference in results. When the ground is grassy, check rows are best. If not, I would plant in drills one way.

Mr. Converse.—I have never seen but one silo that was hooped with the Page fence. That was at Cornell, but it was not, in my opinion, keeping the ensilage just right.

Can a silo 24-feet deep be successfully filled with a two-horse tread-power?

Mr. Rogers.—I will say that, in my opinion, one would be losing money and time in trying to cut ensilage and elevate it twenty-four feet with a two-horse tread power. Use an engine instead.

What makes my ensilage spoil around the inside walls of the silo?

Mr. Cook.—Possibly the silo is not airtight and air gets in at the sides of it. Or it may be caused by improperly filling the silo. The ensilage should be kept highest on the outside, next the walls, and be well trodden. If it is kept highest in the center, when it settles there, it will draw away from the walls, thus allowing the air to get in. Keep the surface of the ensilage in concave shape, about like that of the inside of a saucer.

What about the stone silo?

Mr. Cook.—There is nothing about it, except that you don't want one. The first silo I ever saw was a stone one, and the next spring after it was filled the first time, one-half the ensilage in it was drawn out and thrown away. It was rotten and worthless. If you are going to build a silo make it of wood. It will not cost a fourth as much as will a stone one and the ensilage will not mold if it is in the proper stage when put in and is properly packed.

Is sorghum a good and profitable crop to raise for green feed and for ensilage? Where can the seed be obtained?

Mr. Cook.—The seed may be obtained of any of the large seed dealers or of the western growers, but I would not plant it. It was experimented with considerably some years since, in various parts of the State, but it was abandoned, it having been found that corn was much better for a soiling or ensilage crop.

Will it improve the value of ensilage to allow the corn to wilt, a day or two, before cutting it into the silo?

Prof. Cavanaugh.—Are there any farmers here who have tried the plan?

A Farmer.—I have. I allow it to lie and wilt a little, then cut it into the silo. It was a success.

Mr. Litchard.—Such a plan is all right unless a rain falls, and if there are no yellow leaves in the corn; but, if a rain falls while the corn is lying in bundles, it will surely injure it. What is wanted in corn ensilage is succulence. So, if we allow the corn to wilt or dry, we lose much of that element.

Would you advise the treading of ensilage, solid or not, in a silo?

Mr. Cook.—Ensilage needs only a reasonable amount of pressure, and it should be evenly distributed. As a rule, the heavier portion falls directly under the carrier, so that it should be carefully spread over the entire surface. If the silo is tight, when the ensilage is well spread, but little treading is needed. But one may tread it too much.

Does ensilage injure the flavor of milk? Will it impart bad flavor to it?

Mr. Cook.—If the ensilage is not well grown and preserved, I will say yes. Or, if the silo is not tight, thus allowing the ensilage to mold, the same result will ensue. But when the conditions are all right the only flavor which ensilage will impart is a good one.

Have you ever heard of an authentic case like the following clipping: "J. B. Bristol of Westfield, has just lost two valuable horses. The cause of their death is supposed to be due to eating ensilage. Mr. Bristol has a silo which he fills each year with green cornstalks, which are cut and made into ensilage. He fed some to his horses with fatal results. One was sick only a few hours; the other was sick four days. He valued the team at $300."

Mr. Cook.—I remember back, eight or ten years ago, in the early days of ensilage feeding, when it was reported that several horses near Rhinebeck had died from eating ensilage. I have never heard of a case of this kind since, until I read this.

Mr. Moore.—One of my neighbors lost a horse from eating ensilage, but he fed him so much that it caused colic.

Is it of advantage to feed beets with ensilage?

Mr. Chapman.—I have fed both beets and ensilage, two winters. Have concluded it does not pay to grow beets when I have ensilage.

Counting the expense of silo construction and filling, which is the cheaper and of most feeding value—ensilage or corn-stalks?

Mr. Ward.—The most expensive way to save a corn crop is to cut, shock and husk it. We once made the experiment and found that it costs $2.08 per acre more to harvest it that way than when put into the silo. Then, when it came to comparing the two, the old way did not compare at all with the ensilage. I think the feeding loss will be about thirty to forty per cent. in the old way, while not more than two to five per cent. will occur in ensilage.

What is the cause of ensilage molding about 18 inches deep from the outside, and the inside being good?

Mr. Converse.—I never have seen such a condition except when the stalks were too dry when put into the silo. Such corn ought to be wet down somewhat when cut, to hasten fermentation.

Why does ensilage mold in spots in the silo?

Mr. Ward.—It is on account of uneven treading. There would be no moldy ensilage if the treading were evenly and thoroughly done.

Why make ensilage, if the corn stalks have a food value of 1.013 and ensilage only .349, according to the chart?

Mr. Converse.—An acre of corn stalks will not weigh to exceed five tons, while an acre of ensilage will weigh from ten to twenty tons. It is not the question of per centages, but of weight that must be considered, also that of succulence.

How much corn ensilage should we feed a cow?

Mr. Cook.—From thirty to fifty pounds. We have even fed more than that, but I have come to believe it not best to feed too much of it, and I find by experiment that a little loose coarse fodder or dry hay is better when fed in ensilage. We also get a better flow of milk when the cows are on pasture if they are fed a little hay daily.

Will the feeding of ensilage cause tuberculosis?

Mr. Cook.—Now, if that man had put in: "will it injure the teeth and kill the cow," we would have a little longer text. No; ensilage made from good corn and put up properly will never injure a cow, but a whole lot of them are injured because of a want of it. We had a cow sixteen years old which we fed all the ensilage she would eat, but she thrived wonderfully on it. We have been feeding it fourteen years, and are more fully impressed of its value every year; and we find upon inquiry, that our experience is the general verdict of almost all farmers when asked to give their opinions.

Will calves fat well for veal when the cows are fed ensilage? If not, why not?

Mr. Cook.—I don't know why ensilage milk should not be just as good for calves as for any other use. Of course, they should not be fed ensilage alone. There should be some protein grains with it.

At what stage of ripeness should corn be cut for ensilage, and how long a time may one be in filling a silo?

Mr. Ward.—Cut the corn just as it enters the glazing stage. It is then at its best. You may, if you can, cut the corn and put it all in directly from the field, in one day, or you may be several days about it. It will not injure the corn if it is allowed to wilt and dry a little, so you may have intervals of a day or two; but at that season the corn will be ripening rapidly and the stalks losing in feeding value; so I would hurry the corn into the silo as rapidly as possible.

What variety is best for ensilage?

Mr. Ward.—The one that will mature the earliest and produce the most on an acre on your farm. With us the large dent varieties are preferred to the flint sorts. As a rule, we grow for ensilage, "Pride of the North" or "Leaming." There are some other dent sorts that are also good for the purpose.

Mr. Cook.—"Pride of the North" is a good variety for ensilage when you get it pure. But the trouble is there are numbers of bogus varieties sold for it. I bought some at one time which was not "Pride of the North," at all. Some dealers sell any variety that has a dent in it for "Pride of the North."

With us, in Lewis county, we find "Leaming" the best for ensilage. We want the variety that will produce the largest crop and mature it in our latitude.

Mr. Chapman.—"Huron's Dent," a variety that originated in Ohio, is being planted largely in Tompkins county, ripening in about ninety-five days there; but it does not produce as many tons on an acre as do some of the larger dent sorts.

Has the feeding of ensilage anything to do with tuberculosis in cows?

Mr. Van Alstyne.—Not any more than has the feeding of any other food, except, that if a man fed it to cows, then turned them out of doors all day long in winter and exposed them to cold weather, they might catch a cold, which, possibly, might develop into tuberculosis. There were more chances for catching cold here, last evening, and thus causing tuberculosis among some of us, than for a cow to get the disease from eating ensilage. Tuberculosis is nothing more or less than what we know as consumption, and has been growing less during the last twenty-five years, there being more than 10 per cent. less in our cattle and 20 per cent. less in the human family in that time.

Has Mr. Cook had any experience with octagon siloes?

Answer.—No, sir; but there is a gentleman present who has.

The Gentleman.—It costs a little more to build an octagon silo than it does a round one; but once built, one does not have to watch it or repair hoops. No tarred paper is used. I have three of them, made of two by six stuff. They have been in use three years; would not build any other form for myself.

Is it best to cut down the ensilage or feed from the whole surface?

Mr. Litchard.—It would depend on how large the silo was, or how much ensilage is being fed. As a rule, it is better to feed from the whole surface, enough each day to prevent the ensilage from spoiling.

Do you partly cure the corn before putting it into the silo, or cut it directly into it?

Mr. Terry.—It would depend on circumstances and conditions. We have had as fine ensilage from corn partly cured as from that cut into the silo directly from the field. As a rule, the greater portion of the evaporation comes from the leaves of the corn which contain but little feeding value.

In what manner does ensilage injure milk? Dr. Jordan, please answer?

Dr. Jordan.—It would depend. I am convinced, however, that good ensilage will not injure any milk. We have made cheese from milk from ensilage-fed cows that, within a year, scored 100 points. But there may be poor ensilage, which would injure milk, butter or cheese.

Mr. Dawley.—The four highest scores of butter at the Dairymen's convention at Cortland, last week, were made from milk from cows fed ensilage.

Mr. Cook.—We are now shipping milk to New York made from cows fed on ensilage, and we never had better milk. But there are many farmers who have, and are now, putting in unripened ensilage and in improperly constructed siloes, which cause trouble. The condenseries refuse their milk because of their neglect. When this objection has been overcome, there will be no further objection, and milk from ensilage will not be refused.

Is it cheaper to build one large silo or two small ones?

Mr. Ward.—It would depend. If one has not stock to eat the ensilage rapidly enough, it is better to have two small ones. In that case not so much surface will be exposed to the air.

Which is the best, to shred ensilage or cut it off square?

Mr. Ward.—All things considered, I think that ensilage cut square and short is preferable to that which is shredded.

A Farmer.—I prefer the shredded, two to one.

Would a silo built of the same material as water tanks—iron or steel—be as good as wood?

Mr. Cook.—The trouble with steel, iron or stone is, they are conductors of heat and frost. We want one built of something that is a non-conductor. Siloes have been built of steel, but I have never seen them, and there have been but few built. I think that wood is the only material to use.

Does sweet corn make better ensilage than other varieties of corn?

Mr. Litchard.—I do not think it makes as good. Would rather have the common yellow corn than any variety of sweet corn for ensilage. It looks nice and tastes sweet on the table, but the cow says she prefers some other variety.

What causes white mold in ensilage?

Mr. Litchard.—There are three or four causes. As a rule, it is caused by the corn being too ripe when put in the silo. Such corn, unless it is well wet down, will mold. It may also be caused by too much moisture; then, again, by not feeding it rapidly enough, too much of it being exposed to the air.

What is the feeding value of ensilage as compared with $10 hay?

Mr. Litchard.—There is a difference in ensilage, just as there is in hay. As a rule, good ensilage as compared with good timothy hay, two and one-half tons of the ensilage is worth one ton of hay.

Is there a better way to use corn than in the silo?

Mr. Litchard.—I know of no better way. We have been, during the last four or five years, husking our surplus corn, and we find one ton put in the silo worth at least three tons cured and fed in the old way.

A Farmer.—Do you mean to say that you would feed this ensilage in the summer?

Mr. Litchard.—Certainly; there is no time in the year when ensilage is worth so much as in the summer, when the pastures are short. Next summer I am going to have a silo holding 75 to 100 tons, filled especially for summer feeding. I have learned that I cannot go through these summer drouths without it. The value of the silo is just as much of an established fact as is the river St. Lawrence and no one knowing anything about it will dispute the statement.

Why should corn in a silo spoil on two sides next to the boards?

Dr. Smead.—Doubtless the silo was not tight on those two sides, and so allowed the air to get in; or else the ensilage was not tramped enough.

Mr. Litchard.—Possibly the silo is not deep enough or the corn was too green or too ripe. We cannot take out anything from a silo we do not put in, any more than one of these ladies can take out something from a fruit can she did not put in. If she puts in unripe, over-ripe or wormy, half-grown fruit, she will take it out when she opens that can.

Would it be advisable to use Page fence as hoops for siloes?

Mr. Gould.—I would not use anything else. It costs less, and less for bolts than for wire hoops, and pulls the staves together so that you can't see between them in August any better than in December, while it costs but $6, against $20 for round hoops for a silo.

Mr. Woodward: The Page fence people advise me that they are making a special fence for siloes, that costs less than ordinary fence.

Does it pay to cut or shred corn stalks?

Mr. Van Alstyne.—Yes; more good can be got out of shredded or cut stalks than whole ones; but neither of these can take the place of good ensilage.

Do you advise building a silo in the barn?

Mr. Cook.—If one has a barn large enough, so that the room for a silo can be spared, he may build a silo in it. There will be some saving in cost, because at least one side of it will have already been built. Then, too, no roof will have to be put on. But one may build one outside, and we have found that no loss from freezing the ensilage, if it is allowed to thaw without being exposed to the air, will ensue. If the frozen ensilage is raked into the center of the silo and the hot ensilage there mixed with it, no loss will be experienced.

Why do some first-class condenseries reject milk from ensilage-fed cows?

Mr. Cook.—The Borden people first interdicted ensilage years ago, because there was much sour ensilage put up. But I have found good authority for saying that fully as good milk can be made from good ensilage as from any other food, and it is being made from such ensilage all over the country. The St. Johnsville Condensery receives ensilage milk and says it is their standard for good milk. There are also creameries in the west which accept such milk and want more of it.

A Farmer.—I have a silo, but have no trouble in making good milk from my ensilage.

Is the round silo preferable to the square one?

Mr. Van Alstyne.—Yes and no. The round silo has no corners, which is a benefit if outside the barn; if, on the inside, build it square, because it can be built more cheaply there. It is a question of economy and the place it will occupy. My siloes are all square, but if I were going to build another outside it would be a round one.

Can we avoid a bad odor in ensilage?

Mr. Van Alstyne.—Certainly. When the corn is put into the silo, when in the glazing stage and is well tramped, there will be no odor from it. Last year a gentleman visiting me asked where my silo was. I said: "Step back about six feet and you will be in it." It is the immature corn that causes odors from ensilage.

What particular form of silo has given the best satisfaction—round, square, octagon or parallelogram?

Mr. Ward.—If one does not care so much about the cost I would recommend an octagon silo. But, barring that item, I would build a round one.

At what stage of ripeness should corn be cut into the silo?

Mr. Converse.—I would cut it at its greatest feeding value, which is at the time it enters the glazing stage. Fifty-five per cent. of the value of the plant is in the stalk, and sixty per cent. of that value is below where the ear grew.

Is ensilage in any way injurious to live-stock?

Mr. Converse.—No, sir, provided it is good ensilage and is properly fed. But it should be balanced with nitrogenous grains.

Mr. Ward.—There are 100 of them within five miles of me—all very much alike, and I have never heard a word of complaint about ensilage injuring animals.

How large would a silo have to be to hold 75 or 100 tons of ensilage?

Mr. Cook.—The weight of ensilage will depend on two conditions—the depth of the silo and the fineness of the cut ensilage. A silo sixteen feet in diameter and twenty-five feet deep, if filled to the depth of twenty feet of settled ensilage, will contain about eighty tons.

Mr. Ward.—How many of you here have siloes?

Just four hands were raised.

Mr. Ward.—Only four farmers in this audience who have siloes, and this the best part of Livingston county! I guess I will stop talking about the silo and talk about a cock or dog fight.

A Farmer.—Don't do that; keep right along. We did not have any siloes here four years ago.

Mr. Cook.—That is a very good record; one silo a year.

Mr. Ward.—We have more than 100 round silos within five miles of Batavia, one-half of them having been built within the last five years, and the number is constantly increasing. In fact, I do not know of but one man who has abandoned his silo in all that number.

Will sweet corn that has had the ears snapped off make good ensilage?

Mr. Ward.—No. I would not use sweet corn for ensilage. Some of our farmers who patronize a canning factory put the stalks into their siloes, but, as a rule, they are too tough and are not nearly so valuable as some of the dent sorts for ensilage.

What is the cost of a silo such as was described this morning?

Mr. Ward.—Not counting the work of setting up, which was done by myself and hired help, our silo, holding 75 to 80 tons cost $48.60. It would cost more now on account of the higher price of lumber and hoop iron. Ours is of hemlock, and after having been filled seven or eight years, is as sound as it was when it was first built. But ours is inside the barn. There is danger, however, that a round silo outside the barn will blow over. If I were to build one outside I would put a cover around and over it.

Is ensilage a good food for horses?

Mr. Ward.—We have fed ensilage to horses in limited quantities. Would not feed it alone. We feed it once a day.

Would you borrow money with which to pay for building a silo? Would it pay?

Mr. Ward.—If I had live-stock, I would build a silo. If I did not have the money, I would borrow it. If it burned up the next year, I would have had my money back.

Would you hill ensilage corn or drill it in?

Mr. Cook.—I don't think it would make much difference whether the corn is planted in hills—that is, check-rows— or in drills. The ground may be better cultivated when in check-rows. If the land is full of quack, check-rows are the best, because the ground can be more evenly reached with the weeder and cultivator. But, if the ground is free from foul stuff, probably best results will come from planting in drills, one kernel about every eight inches, and the rows about three feet, two inches apart. If every seed should grow, about ten quarts to the acre would be enough; but it will not; therefore, we plant a bushel of seed on every two acres.

Can good butter or cheese be made from milk from cows fed on ensilage?

Mr. Smith.—Yes. I made butter from milk from cows fed ensilage, which scored 100 points at the State fair. Of course we did not compete for a premium. The cows had no pasture at all, but were fed entirely on alfalfa and ensilage, with daily grain rations.

Dr. Smead.—Speaking of ensilage, I will say that at the Clifton Springs Sanitarium farm, 180 cows are kept on 180 acres of land, and ensilage is fed every day in the year. There are 480 patients in the institution, and all eat the butter made from the cows and drink their milk. If there was anything wrong about the milk, ensilage would soon be rejected. The superintendent told me that he was going to try to keep 200 cows on those 180 acres next year.

At what length would you cut ensilage? Is it best to shred it?

Mr. Converse.—We have tried various lengths, from half an inch to two inches. Half an inch we think best. It spreads more evenly and compactly than does that cut longer. Shredded ensilage has no particular advantage over that which is cut off short, while the cost is more because of an increased price of motive power.

If you were feeding ensilage once a day and timothy hay twice a day, what grains would you feed to balance the ration?

Mr. Smith.—Both foods are carbonaceous. We should always consider cost. I would try protein foods—wheat, bran, gluten, dried brewers' grains or malt sprouts. These are protein foods, which should be added to the others, to make a balanced ration. Send to Geneva, and get the bulletins which treat on these feeding questions.

What effect would bean meal have on ensilage?

Mr. Gould.—While in Maine I was told that bean meal, up to two or three pounds per day, make a good ration for milch cows.

Mr. Eastman.—In feeding bean meal alone with ensilage, the cows are liable to scour; we want some bran with it.

Some factorymen claim that if every dairyman fed ensilage, a good article of butter and cheese could not be made. Is the statement true?

Mr. Cook.—Not with us; I can make as good butter or cheese, if not better, from ensilage properly balanced than from any other foods; and that is the verdict of all our best creameries or cheese factories in the State.

J. F. Converse.—If ensilage is what it should be, it is just as wholesome and as healthful as any clover ever cut; but, there is now and then a farmer who feeds moldy ensilage which effects the milk, and there are some men who have abandoned their siloes because they were not properly constructed or the corn was not properly grown or ensiloed; but the masses who grow and feed ensilage are not abandoning their siloes or ensilage; on the contrary, the number of siloes hereabout is increasing each year. The prejudice is more against those who feed ensilage than against the ensilage.

Can a poor man, with a mortgage on his farm, afford to build a silo?

Mr. Rogers of Binghamton.—It is the poor man who cannot afford to do without it. He can keep his cows more cheaply than on any other starchy foods, while the quality of the milk from the cows, when the ensilage is properly made and put up, properly balanced and fed, is the very best. No! The poor man should be the first to build the silo. The rich farmer can get along without it, but the poor man, if he reaps any profits from the cows, must have it, if he wishes to lift that mortgage.

To Mr. Cook.—Do you recommend the Page fence as hoops for round siloes?

Mr. Cook.—Has anyone here had any experience with it?

No answer.

Mr. Cook.—I don't know. I have seen siloes hooped with Page fence. Will build two round siloes next season. Will not use the fence. Am in doubt. Have been reported as saying that I would use it. I have never said any such thing, because I know nothing about the practicability of the fence, for the purpose.

Mr. Smallwood.—No Page wire fence for my silo. I patronize home men. We have one right here in Warsaw who makes round iron hoops and fits them, ready for the silo. They are good enough for me.

Is it possible to produce as good milk from ensilage as from roots and grain?

Mr. Olin.—I prefer the ensilage, although I have fed both. I have found, also, that the roots and the ensilage work very well together. I fed both, all last winter, and obtained satisfactory results.

Mr. Cook.—The fault that once came from ensilage was caused by putting up the corn when not properly matured. But we hear but little of that now. It is one of the best cattle foods; but there should be some grain fed with it.

What is the manurial value of ensilage?

Mr. Cook.—It is very low, only about 82 cents per ton.

Would ensilage be a good food for sheep in summer, in place of pasture?

Mr. Cook.—Have any of the farmers here had any experience in feeding ensilage to sheep in summer?

No answer.

Mr. Cook.—I do not know anything about it, having never fed ensilage to sheep.

Mr. Talman.—I have not fed ensilage to sheep in summer, but I do not see why it could not be done. He also said that he had seen a flock of sheep that had been fed on ensilage alone during the winter and that they came out fat, only a tenth of corn meal was required to " finish them off " for market.

No one answered the question, but three or four farmers said they had fed ensilage to sheep in winter with highly satisfactory results.

What is ensilage feed valued at and its cost?

Mr. Cooper.—It would depend on the quality of the ensilage. It is worth from $2 to $3 per ton when the corn is fully matured.

Mr. Converse.—It may be raised for $1.50 per ton, depending, however, on circumstances—such as yield. I would use the largest variety of corn that will mature. My experience is that we can ripen any of the largest varieties of dent corn in 100 days. If we give proper cultivation, we may advance the ripening period of at least 10 days. Some farmers advise the raising of the larger flint varieties because they ripen earlier than do the dents. But as a rule, when the crop is put in early enough, and the proper cultivation given, we find no difficulty in maturing any of the dents such as " Pride of the North " or " Leaming."

Is it better to feed sowed corn in the dry stalk or feed in the form of ensilage, for making winter milk?

Mr. Ward.—I suppose that means sowed corn. I would never put sweet corn in that way. It were better to plant it in rows, three feet and a half apart. We use Stowell's Evergreen for that purpose, and plant about 14 quarts of seed per acre. If I had such sowed corn I would allow it to dry a little, then put it into the silo.

Could a man afford to borrow $100 to expend in building a silo?

Mr. Cook.—Yes; if he has a dairy that will consume the contents of such a silo. The interest on that sum would not be much, while the silo would enable him to keep two or three more cows. I believe it will pay one to borrow the money to build one.

When a man has a silo he will be surprised to see how much a cow will eat, and will begin feeding better. For one, I much prefer to have one cow well fed, than two half starved.

Will corn put into the silo whole keep in good condition?

Mr. Ward.—We had a neighbor who filled two siloes with uncut ensilage. The next year he took it all out and threw it away. I never have known of whole ensilage keeping well.

What can I best raise to put in my silo to feed during the drouth in summer?

Mr. Terry.—Corn. It is the best crop; but one must supplement it with some protein crop, such as wheat bran. One should have two siloes, one for summer the other for winter feeding.

Mr. Cook.—Have two siloes—and do not make the mistake of making them too large, because we ought to feed off enough from the surface to prevent the molding of the ensilage. Next summer we will build two additional siloes, one to be filled with corn for summer feeding, as I am satisfied the cows suffer more for the want of proper food in summer than in winter, and summer ensilage will supply the want, in great part.

How do peas and oats compare with corn as a soiling crop?

Mr. Cook.—We prefer the peas and oats, for the reason that they contain more protein than does the corn. But one should have both; one to balance the other. Still, when corn is well grown and preserved in the form of ensilage, it seems to knock out, somewhat, the objection that it is not a milk-producing food.

Which do you recommend for a summer soiling crop, newly mown alfalfa or good corn ensilage?

Mr. Converse.—We have had considerable experience in feeding alfalfa and ensilage as soiling crops. We prefer the latter for the reason of the expense attending the going into the field every day and cutting alfalfa. At our cheese factory, and another one a mile away, last summer, only eleven patrons out of seventy-one had anything to tide their cows over the drouth. It is one of the gravest and most costly mistakes the average farmer makes—this neglect to provide some soiling crop for the cows when the annual drouth comes on. Beside that, when we have ensilage, we can keep the cows indoors during the severe hot weather in fly time and let them out during the night.

Mr. Smith.—At the State farm, Geneva, we resort to alfalfa and ensilage. The very best results come from both. Last year we fed ensilage during the summer and got fully as good results from it as from alfalfa. If you are going to count the cost of the two crops, together with the expense and convenience, as between the two, we prefer the ensilage for summer feeding. By this I mean green alfalfa. We cut it in the morning, when the dew is on, then allow it to dry and wilt. It is then drawn to the barn and fed. No cases of bloat have ever occurred. About a basketful of alfalfa is fed twice a day to each cow.

THE CLOVERS—THEIR VARIETIES AND USES.

To Mr. Terry.—At what stage of growth should clover be plowed under?

Answer.—It is not safe to plow under any green crop if too heavy, because there is a tendency to create acid in the soil, and I should not plow under a green crop of clover. Cut the first crop for hay, and leave the second crop on the ground to be plowed under in the spring, for potatoes or corn. During the last three years, we have made two to three cuttings of clover each season, and fed it to our cows. If I were going to plow under a green crop it would be "cow peas." They are nitrogen catchers, and will, besides, furnish humus for the soil. The variety known as "Whipporwill," is the best of the cow pea variety.

Mr. Cook.—With the dairy farmer, two things must be considered when contemplating a crop—first, its feeding value; second, its fertilizing. When we come to this, if we grow it, clover for the protein ration, is the best. Its nitrogenous value is the greatest of any of our grasses while its fertilizing value is fully as great.

Is not timothy a better fodder crop than clover?

Mr. Converse.—No, sir; it is not. I would rather have one ton of clover than two of timothy for any animal except horses kept for speed. But, clover should be cut as early as June 25th, then the second crop may be cut early, and saved in the form of "rouen." In this way we get the feed value of both crops.

A Farmer.—All the improvement in Allegany county which has come to it within the last 30 years has come, in my opinion, from timothy. Why do men buy timothy instead of clover? Years ago, there was a tavern every mile on our public roads in this county, and about all the products were leeks and whiskey, and the buildings were poor. Now they are all good, and the difference is due to timothy.

If a crop of timothy is cut early and not pastured, is it more exhausting than is clover?

Mr. Converse.—Yes, sir. We all know that the legumes take nitrogen from the air and restore, or give it to the soil. The clovers are of this class of plants. Timothy does not absorb nitrogen from the air, but, on the other hand, takes it from the soil. For this reason we do not grow timothy at all. We do not mow clover but once, but plow under the second crop.

How can we get a good crop of clover on hard pan soil?

Mr. Converse.—Our soil is a clay loam. We have changed from seeding with clover on a spring crop or with winter wheat. We now sow oats and peas on the land we want to seed. When the crop is off we harrow the ground and fit it thoroughly; then sow the clover seed about the first of August. As a rule, the next year's crop of clover will be as heavy as will that sown in the spring, even when we get a good catch.

Mr. Moulton.—The trouble with hard-pan land is, it is not plowed deeply enough, so that the water comes up and stands in the soil too closely to the surface. Plow the land deeply and fit it finely so that it will not "heave" in the spring. By following this plan on a stiff, hard-pan soil, I do not believe there will be any trouble in obtaining a catch of clover, even when sown with spring crops.

What is your opinion about sowing red clover and cutting it one year, then plowing under for humus?

Mr. Van Alstyne.—If I wanted to grow a spring crop, I would plow under the second crop in the spring. If I wanted to grow a winter crop, I would plow it under in the fall, but would cut and save for hay, the first crop.

What is the difference between mammoth and pea vine clover?

Mr. Converse.—I suppose what is meant by the queston is the medium or mammoth variety. If so, I will say that I prefer the medium to the mammoth, as it does not fall down so easily. Besides, finer in stalk and is eaten more closely by the cattle than is the larger variety.

Mr. Cook.—We sow both mammoth and medium on our land. I prefer the former. We sow at least three bushels of it to one of the medium.

Has anyone here had any experience in pasturing with alfalfa?

Mr. Cook.—Alfalfa is being sown with success in many places. It should be sown thickly so as to have a thick growth. The soil should be deep, dry, well fitted, and the plant given the entire use of the ground. The next season, from two to four cuttings may be made. As to pasturing it, I will say that it may be done, but there is danger of the animals' eating the plants so closely as to injure the crowns. It is much better to mow and cure it for hay; but it should be cut early, else it will become woody. It should be cut the first time as early as June 6th to the 20th, and again in July. When the seed is allowed to mature, the plant is about worthless for hay. As many as four cuttings were made at the Geneva Experiment Station, the soil being a deep clay loam, well underdrained. There were more than 16 tons of green hay in the four cuttings. If you will go to Geneva next summer you will see the field and will be able to obtain full information concerning it. I also think there has been a bulletin issued at the station giving some results with it, but that was three or four years ago.

Who grows it here?

A Farmer.—I have, but it has been a failure with me. Practically it was all gone in two years. It is not as good as the clover here.

Mr. Cook.—Have well prepared land and have it dry; then sow 30 pounds of seed per acre and give it the whole use of the land. The critical period is its first winter. If it survives that, there will not be any further trouble. I would try a small piece of it to begin with. If you succeed with it, sow more.

Mr. Litchard.—Years ago I tried it. Won't say anything about it now.

A Farmer.—Over on the river flats, a man has three or four acres. He reports satisfactory results.

Mr. Hardy.—I have a small piece of it. It is satisfactory, but we found when plowing the ground roots five feet long, and the plow might as well have run against a stump.

Mr. Dawley.—That came from not sowing the seed thickly enough. When 30 pounds of seed are sown, the spears are much finer, but the cutting should be done before the seed is formed, else the plant will become hard, woody and entirely worthless. Sow it at the time the spring grains are put in, and when the plants and weeds are a foot high, run the mower over, and cut everything down to within four to six inches of the ground, and leave it for a mulch, unless there is too much of it. In that case rake it up and draw it off. The next season, if it withstands the first winter, there may be two or three more cuttings made. We have cut ours three times, but as a rule we make but two. We have a field of it that has been growing 10 years, and the stand seems to be as good as ever.

If you are to grow it, either have the soil well underdrained, or else put it in good soil, naturally dry. Alfalfa will not grow on wet land, although it requires moisture. It is a very deep rooter. The roots go down, if they have the opportunity, several feet. Last summer, about all the green thing on our farm was the alfalfa. Professor Voorhees, of New Jersey, says he grew on the station farm there an equivalent of $125 per acre of protein in an alfalfa crop. It has about the same power, possibly a little more, of taking nitrogen from the atmosphere and giving it up to the soil as have the red clovers.

Would you advise seeding to grass or clover with the corn?

Mr. Litchard.—I have never tried the experiment, but I know of its being done in Chautauqua county and it is said, quite satisfactorily. We have, sometimes, sown clover with our corn. I have ten acres that have never had a load of barn manure or a spoonful of phosphates on them, that are now producing good crops. They have been kept fertile by the use of clover and cultivation. We take off, first, a crop of clover, and follow that with either potatoes first and then corn, or corn and then potatoes. We always plow under the second crop of clover. As a rule, I use winter wheat for a seeding crop.

Which food is the richer in protein, clover or bran?

Mr. Cook.—Bran is the richer in protein of the two. It has a ratio of 1 to 4; clover has 1 to 5 or 6.

To Mr. Smith.—What kind of soil does alfalfa require?

Answer.—Alfalfa needs a deep, rich soil, free from water. You could not go down on to this flat and grow alfalfa. Have the ground rich and made fine by cultivation, and the subsoil broken up so that the roots can go down. And it is a good plan to nourish the young plants with a top-dressing of good, fine manure. Sow 30 pounds of seed per acre.

Do you favor the seeding with clover in August, after oats?

Mr. Cook.—We sow the clover seed on winter wheat in the spring. Seeding after oats in August is recommended and is practiced by some farmers. I prefer spring seeding, however, on our farms in Lewis county.

What grains are best for a seeding crop with clover?

Mr. Eastman.—Spring wheat first, winter wheat second, barley third.

Mr. Cook.—After all, is it not a question of moisture? So I would not seed with oats; they take out nearly all the moisture from the soil, thus robbing the clover; consequently it dies.

How is rape as a fertilizer plowed under?

Mr. Gould.—Analyses show rape to be half as rich in nitrogen as is clover.

How can we get our clover seed to catch in a dry season?

Mr. Eastman.—By putting the clover seed in in the best manner possible. The ground should be properly fitted and fined, the grain drilled in, then fallowed with the smoothing harrow, then with seeder, which puts the seed in at shallow depth. The trouble is, the clover seed, as a rule, is put in too deeply. Where is the lady who does not fine her flower seed bed with a rake before sowing the seed? Surely, there is no more vitality in clover than flower seeds.

What variety of alfalfa is best? How much seed should be sown per acre, and how should it be sown?

Mr. Smith.—I know of but one variety of alfalfa. It has a small, purple blossom. We have eight acres of it at the station farm at Geneva, and feed 25 cattle from it.

Will the feeding of alfalfa cause "bloat"?

Mr. Smith.—Yes. So will the feeding of too much clover. Alfalfa, in fact, is one of the clovers.

When do you cut it?

Mr. Smith.—Just before the blossom forms. If left till a later date it will become hard and woody.

Do you grow crimson clover on the State farm?

Mr. Smith.—Yes. We grow it in the orchards. Last year it was a beautiful sight when in blossom, about the middle of May. We sow the crimson clover and winter vetch about the first of August, as a cover crop, on our plowed land.

What about the vetches? How many varieties are there?

Mr. Smith.—I do not know. The vetch belongs to the pea family—is therefore a legume—and has the power of gathering nitrogen from the atmosphere. Crimson clover has the same power, and an additional value because it grows at a very low temperature, therefore, very late in the fall. We grow it as a cover crop—to plow under in the spring—not for hay, nor for pasture.

How shall we grow clover on some farms where we cannot get a catch?

Mr. Smith.—There are two causes: An acid oil, or want of humus. Test the soil with blue litmus paper. If there is acid in the soil the color of the paper will change to red. An application of lime will sweeten it. If the cause is a lack of humus, the plowing under of rye or barn manure will furnish it. There must be humus present to hold moisture, to unlock plant food which is unavailable. Wood ashes may be applied in place of the lime. They contain about 60 per cent. of lime, four to five per cent. of potash, and one and a half per cent. of phosphoric acid; but the latter is very slowly available. Good, unleached hardwood ashes ought to be worth from $6 to $7 per ton, depending upon locality and the cost of lime.

How early is it advisable to sow clover seed on winter grains?

A Farmer.—I sow it in March.

Mr. Cook.—We sow it on the sugar snow, say the first to the middle of April, sometimes a little later in the season.

Should alfalfa be sown in an orchard? Would it injure the trees?

Mr. Armstrong.—I have an uncle in the West where they grow a great deal of alfalfa, who sowed some in his orchard, but a number of his trees died, before he could plow up the alfalfa. He thought it rooted so deeply that it took all the moisture away from the roots of the trees.

A Farmer.—Will alfalfa grow on steep hillsides?

Another Farmer.—Not on yours. It would all slide off.

Mr. Smith.—It will grow if the soil is suitable.

Will Mr. Terry tell us how to raise the first crop of clover on poor land?

Mr. Terry.—I cannot answer that, but there may be circumstances where the farmer may help himself. Sometimes a soil is acid. If it is, clover will not grow. An application of 20 or 25 bushels of lime per acre, or of potash, will sweeten the soil. At other times a lack of humus prevents the soil from holding moisture, so the young clover plants, when the drouth comes, die out. Between the two—lime and potash—with the humus in the soil, as a rule, clover may be made to grow. I would not sow timothy except, possibly, in small quantities, say four quarts of seed per acre.

What would you do with the clover when grown?

Mr. Terry.—That would depend. Formerly, we plowed under the second growth of clover. We then kept no cows. Now we are keeping some, and so cut some of the second growth clover for them. We have built up a herd which gave 7,341 pounds of milk last year. One two-year-old heifer gave 6,000 pounds. We now get $1.40 for 40 quarts, minus 15 cents per can, freight, delivered in Cleveland. We have ten cows.

Is alfalfa as good a crop as the common red clover varieties?

Mr. Terry.—I heard Prof. Voorhees say that they cut 20 tons of green alfalfa from one measured acre, containing 1,560 pounds of digestible protein, which is fully four times as much as can be obtained from an acre of the red clover varieties.

A Farmer.—Here about, alfalfa grows well enough on low ground, but it does not succeed on high land. In California, where irrigation is practical, it grows well; if we could do that here, no doubt it would grow. It roots very deeply—sometimes 40 to 50 feet.

Mr. Cook.—We have grown alfalfa a number of years, but it required much time to learn how to do it. An old Frenchman who worked for us, brought a package of seed from France, and showed us how to sow it; we now succeed, but we first put the ground in the best possible tilth—just like a garden—then we sow nearly a bushel to the acre, early in May. Once well established it withstands a drouth the best of any plant I know. Last year, about all the green thing in sight on our farms, in August, was the alfalfa. But I incline to the belief that upland is better than low land; and I should advise every farmer present to try a small piece of alfalfa by way of experiment; but do not pasture it, and do not sow the seed except in early spring.

What is the matter with the soil when clover has wintered, then does not grow when spring comes?

Mr. Van Alstyne.—I don't know as I can answer that question positively but my opinion is that the soil is acid. Clover must have nodules on its roots, to hold nitrogen, and these nodules will not live in an acid soil. The remedy for such a soil is an application of lime to correct the acidity by sweetening it. Apply 20 bushels per acre. I have just such a field. It grows any crop but clover, so I shall treat it with lime next season.

Mr. Cook.—My observation has been that, on lime-rock soil, clover grows well. In our county the soil is a lime rock and clover grows on it abundantly.

How is alfalfa clover as a substitute for corn for ensilage?

Mr. Cook.—It would not be any substitute, because it is a wholly different crop. Corn is a carbonaceous crop; alfalfa a nitrogenous one. But I should never put it into a silo. Corn is much better. If you can grow alfalfa, cut it early, cure it as hay, and feed it in connection with the corn ensilage. Sow it early, about the time the corn is planted.

To Mr. Van Alstyne.—Would crimson clover thrive in this locality (Schenevus)?

Answer.—Crimson clover is now being grown in the valley of the St. Lawrence river, but, if it is to succeed, one must get the seed grown as far north as possible. Southern-grown seed does not germinate well, or else produces a feeble, weak growth. Obtain seed from acclimated clover and sow it in the corn or potatoes to cover the ground, and to be plowed under the next spring; and be sure to put it in deeply, else it will sprout too quickly. If sown in the corn, run a narrow plank drag or stone boat over the ground to pack it tightly over the seed. Thus grown, one gets two crops on the same ground, and I am satisfied that, if the crimson clover now on my ground does not survive the March and April weather, it will be worth to me all it has cost.

A Farmer.—We do not always get a clover catch here (Springville). It failed two years ago. What are you going to do about that?

Mr. Converse.—I believe that on ordinary dry soil, if clover is not grown, it will be the fault of the man. Of course, there are some wet, mucky soils which are sour, that will not allow clover to grow on them. An application of lime or ashes will sweeten such soils, so that clover will thrive; on fairly good, sweet soils, if humus is present, so that moisture is retained, the clover seed will germinate and the plants grow. You may test the soil by inserting a small piece of blue litmus paper in it for a few minutes. If in that time the color changes to a dull red, you may know that acid is present. If so, apply a good dressing of lime or ashes.

What time of year is best for sowing clover or timothy seed?

Mr. Cook.—We sow our clover and timothy seed on our winter wheat, as a rule, from the first to the middle of April.

Is there any difficulty met here in getting a clover catch?

Mr. Harmon.—Years ago I had no difficulty in getting good catches of clover, but I have not had one in ten years. I believe it is because I have grown so many beans. My loss from failing to grow clover has been thousands of dollars, and I have been forced to resort to commercial fertilizers to replace it as far as I could.

Do we cover our clover seed deeply enough?

Mr. Cox.—I believe that we do not cover deeply enough. I think that is the main reason for our not getting better catches some times.

Does not potash always help the growth of clover?

Mr. Cook.—If there is potash enough in the soil, and it is available, an application of more would be of no avail. If that in the soil were not available, an application of potash would benefit the clover.

At what stage of growth should clover be cut?

Mr. Litchard.—When it is nicely in blossom. After that time it begins to deteriorate. The same is true of other grasses which we use for hay.

How much clover seed is best to sow on an acre?

A Farmer.—Eight quarts.

Another Farmer.—Sow six quarts of clover and two of timothy.

Mr. Cook.—We sow eight to ten quarts of clover and two to four of timothy.

Will clover or corn grown on thin land contain as much feeding value as will that grown on rich land?

A Farmer.—That is my question. I have heard it said that a ton of clover from poor land was not as good as one grown on good land, for feeding purposes.

Mr. Converse.—Dr. Jordan said at Geneva the other day, that they were experimenting along that line, with the view of finding if a plant will take out more from the soil than it needs, but that results will not be successfully reached until after a number of years.

OATS AND PEAS.

What variety of peas do you sow with oats, and how many per acre?

Mr. Converse.—The small white Canada pea. We aim to sow oats enough to hold up the peas, so that they will not fall down and mold. We sow one part of peas and two of oats.

Mr. Cook.—We have no fixed rule; but we aim to sow oats enough to hold up the peas; from three pecks to a bushel and a peck. The first sowing is wholly oats and peas; the later one has a little barley, sometimes half a bushel, mixed with it per acre.

At what stage of ripeness do you cut them, and for what purpose do you grow them?

Mr. Converse.—We cut them just as soon as they show a "yellow tinge," and do it with a mowing machine. They are then too green to be cut with a binder or one of the old "poke off" reapers. At that stage the grain has the most value, while the straw is fully as valuable for feeders as is timothy hay. We allow them to remain on the ground and cure like hay. We feed them for hay, or thresh and grind them. We also use them as a soiling crop, beginning the cutting of them when the first dry weather comes, which is usually about the first of July.

Is there any better grain to sow with peas than oats, to hold them up? What about sorghum?

Mr. Cook.—I do not know of any better grain than oats. Wheat might help out, as the straw is stiffer than that of oats. Sorghum would not do, it is too much like corn.

Mr. Dawley.—Oats and peas are the best crop we grow, except alfalfa, when fed as a soiling crop for hay or to thresh and feed as grain, especially when fed with ensilage. We use the small, white Canadian pea, the mixture with oats differing according to the richness of the land. But we manage to sow oats enough to hold up the peas. We must not allow them to mold. The ideal way is to plow under the peas about four inches, then a week later, sow the oats; but we have had most excellent results by sowing them together. It will depend on the season and condition.

Mr. Rice.—We had most excellent results by putting the peas in with a drill, setting the drill four inches deep, then cross drilling in the oats the same day, at the ordinary depths. Both crops came up at the same time.

Mr. Cook.—We sow from a bushel and a peck to a bushel and a half of peas, and pretty nearly two bushels of oats, per acre, and it will be best to mix in a little barley in the last sowing. We make three sowings of oats and peas each season, at intervals of a week or ten days. The barley is mixed with the last one.

Give comparative feeding value of oats and peas.

Dr. Smead.—Oats have a nutritive ratio of one to seven, bran, one to three five-tenths. Their value would depend on the coarse food one had to feed. If he had a large quantity of straw or timothy hay, more protein should be fed. The best single food for a horse is oats; but if a horse is being worked hard and twelve quarts of oats and two of wheat bran are fed,—I don't care what the coarse foods are.

Are oats and peas as good as clover, and are they good to seed after?

Dr. Smead.—Clover fills a place in American agriculture that no other plant can. I hope therefore that what I am saying concerning oats and peas will not cause them to sow less clover; but as a succulent food to have to feed all animals during periods of summer drouth, oats and peas fill a place that clover cannot; also in seasons like that of 1899, when it becomes a matter of necessity for the New York State farmer to raise something for dry fodder, to carry his live stock through the winter, the oats and peas fill the bill in my experience better than anything else. They can be sown as soon as the frost is out of the ground in the spring, and as late in my section of the State as June 20th, and with even as dry a season as 1899 a fair crop of oats and pea hay can be made, providing the ground is made fairly rich and well tilled. I have cut as many as four tons of cured hay per acre, and never less than one, and that was last year when the extreme drouth made the yield short. As a grain crop for feeding, when sown one-fourth peas (always the small white Canada variety) and three-fourths oats, a feeding grain is produced which when ground is almost ideal for milk production, both in cows and ewes suckling lambs. For horses the peas in the oats are far superior to corn of equal quantity; the nutritive ratio being, when sown in that mixture, a little over one to five, and when the coarse food is timothy hay, it makes a ration for work or driving horses as near perfect as can be. Occasionally a horse of a loose bowel temperament will be a little too much relaxed for road work, but ten horses are constipated where one is too loose. The peas can therefore be added with advantage in nine cases out of ten. The straw also from an oat and pea grain crop I consider equal to average timothy hay, if cut when the oat is in the dough state and the straw green. In cutting hay always cut before the oat gets to the dough state, just coming into the milk; harvest just as hay is cut, namely, with a mowing machine and rake up the same as hay, then all will be eaten without mussing over to get the heads of the oat when cut and cured in that way. The nutritive ratio is about one to eight when sown one-third peas and two-thirds oats, and all animals relish the hay and thrive upon it with but little grain of any kind. While I do not claim that oat and pea hay will equal fine early cut mixed grass hay, in my experience it comes the nearest to it of anything that can be raised on our farms. In a case of emergency or where there is likely to be a shortage in fodder, I have succeeded better in sowing clover or mixed grass seeds with early sown oats and peas than with oats alone, or with other spring crops. In conclusion I will say, sow oats and peas for a grain crop; sow oats and peas for hay when needed; sow oats and peas to cut green during drouth if you have no summer silo, and if it is sheep you are feeding in the barn, oats and peas are preferable to ensilage; then sow lots of clover to feed with your oats and pea straw that you raise for grain. The clover will enrich the soil so that more oats and peas can be raised, to raise more live-stock; produce more milk; more fat lambs; more wool; more good colts; that the farmers may have more money, have better homes and a whole lot of better things.

BEANS.

Have you ever dragged your beans?

Mr. Watson.—I have never harrowed them, but have used the weeder.

Is it proper to rake up beans with a horse rake?

Mr. Harmon.—I tried the experiment last year for the first time. It reduced the labor from one-third to one-half, but the hired help must be instructed thoroughly to shake the earth off them.

Ought beans to be cultivated when the vines are wet?

Mr. Wilson.—No.

A Farmer.—I would not cultivate beans when the dew was on, even. I would rather the hired man would sit on the fence and whittle a stick.

Shall we plow shallow or deeply for beans?

Mr. Wilson.—I prefer to plow deeply, then pulverize thoroughly.

A Farmer.—I think it better to plow more shallow. Our soil is gravelly, and if it is plowed deeply the moisture will go down below the reach of the roots.

Mr. Cook.—When plowing a clover sod I think it better to turn the furrows at an angle instead of bottom side up. If such furrows are rolled down, then well pulverized, they will hold moisture much better than will those turned over and left in a flat condition. Beans, if they "fill" well, must have moisture when the seeds are forming, and as we do not get enough from the usual rainfall it must be obtained by conserving it through cultivation.

Is bean straw a good food for horses or milch cows?

A Farmer.—Bean straw is all right for cows. Feed them only just what they will eat up cleanly. It is next to clover for cow feed.

Mr. Smallwood.—It is all right for horses. I have fed it to Percherons, but they will eat anything.

The Reporter.—The town of Ellisburgh, Jefferson county, produces more beans than does any other one town in the State. There are five wholesale dealers in beans and peas in the town who furnish hand-picked seed to the farmers of that and adjoining towns. The crops are grown on contracts. Two of these seedsmen put out last year 55 varieties of beans and 45 of peas each. There are 6,000 cows in the town, owned by 365 dairymen, nearly every one of whom feed "bean fodder" to their cows, and all agree in saying that such fodder when properly secured is very good, an acre of it being worth fully as much as an acre of average corn stover. But to contain such feeding value the beans must be hand-pulled, cured and housed before the leaves have dried up and fallen off, else nothing but the stalks and stems will remain, thus reducing the value considerably. There is much value also in the pods when properly secured and fed in connection with other foods to dairy cows.

What is the best cover crop to follow beans?

A Farmer.—Winter rye.

Mr. Smallwood.—Many of us sow winter wheat after taking off the beans.

Another Farmer.—I usually sow winter wheat after beans; have taken off as high as 40 bushels per acre of wheat, which was sown on land from which a crop of beans were harvested the summer before.

Will land plaster help beans?

Several farmers said they had used land plaster on beans and were satisfied that good results had been obtained therefrom.

MILK AND ITS PRODUCTS.

When milk two days old is taken to the creamery, what is necessary to get a correct sample from it?

Mr. Cook.—As correct a sample may be obtained from milk two days old as from milk one day old. But I have seen milk that an accurate sample could not be obtained from, whether it was one or two days old. It was caused by some of the cream rising and hardening on the side of the can, so that the per cent. in the milk was lessened. Unless such milk is carefully cared for, correct sample cannot be obtained. Milk should be aërated as soon as drawn from the cow, but if new milk is to be mixed with milk of the day before, it should be cooled to that temperature before mixing both messes.

Should milk be stirred with a dipper?

Answer.—Yes; but the trouble is that it is not always attended to. It is better to use a cooler, than an occasional stirring will answer. As a rule, when milk is poured into the weigh-can, it becomes very thoroughly mixed, so that a correct sample can be taken from it at any time it is running into the vat.

What is sterilized milk and what are its advantages?

Dr. Van Slyke.—The general principle is to put the milk in a vessel through which runs a steam pipe, which heats the milk up to 140 to 150 degrees. The milk is then immediately cooled down. This is pasteurizing. Sterilized milk is that which has been heated to a point which kills all germ life in it, but it sometimes gives the milk a "cooked" flavor.

Will milk containing 6 per cent. fat make twice as much cheese as will 3 per cent. milk?

Mr. Cook.—No. Above about 4½ per cent. milk the fat falls behind the casein, and so will not make as much cheese in proportion as will milk below that figure, for the reason there is not casein enough to hold the fat.

Is butter made from separator cream softer than that made from milk creamed in pans?

Mr. Cook.—No, when the butter is properly made. But cream when it comes from the separator should be at once chilled down to 50 degrees and held till the fat globules have hardened. If it is then warmed up to 60 degrees, ripened and churned, the butter will be as hard as that made from cream raised in pans. Milk goes through the separator at 80 degrees or higher, so that if the cream is not immediately cooled down, but is allowed to settle slowly to 60 degrees and there held and ripened, the fat globules will be soft. This fault was quite prevalent when the separator was first introduced, and people complained that the butter was soft, without grain and would not stand up as did that made from shallow pan or deep-setting cream. When, however, the cause was located and a remedy found there was no further trouble encountered.

A question as to whether the Babcock test was fair for determining the value and price of milk for making cheese, or whether it was fair to all the patrons of a cheese factory to declare dividends on the basis of the fat content of the milk, brought out considerable discussion, Mr. Cook saying that "the old pool system at the factory was simply offering a premium on poor milk. If we are going to pay for all grades of milk alike, why should one strive to have better cows? Why not go out and buy a herd of cows that will give 50 or 60 pounds of milk each that only passes the State test? There is no incentive for a man to improve his herd, except to raise the milk flow, and the thinner the milk the better, provided it will stand the test. Just why so many factories in Allegany county should discard the Babcock test, and why there should be so much opposition to it, I do not understand."

Which is best, to sell our milk or to patronize the creamery?

Mr. Rogers.—It will depend on what you get back. The question is an indefinite one. If a man can utilize the skim-milk at a good profit, the creamery may be the best place. If not, the cheese factory or the shipping station may prove more desirable.

A Farmer.—I patronize the creamery, raising the cream at home. It is called for by a gatherer. Some of the patrons use the separator, others the Cooley system, but the cream is paid for on the Babcock test basis.

Mr. Cook.—We have shipping stations, creameries and cheese factories in our county, and I have noticed that the price of milk at the shipping stations is always based on the value of milk for butter and cheese. When the prices for these products go up, up goes the station's price for milk. When it drops, then down goes the station's price. But there is not enough milk consumed at home. Some farmers do not consume much, if any. Does any one know why? Stop and consider. There is more digestible feeding value in a quart of milk than in a quart of oysters. The milk costs, perhaps, four cents, the oysters from 30 to 60 cents per quart.

To Mr. Cook.—I have been informed that you have stated that the Gravity Cream Separator is a fraud. Now, I and a number of farmers near here have been using it for the past three summers as well as winters, and have failed to discover any fraud or that we could not make as good butter as by any other process. Will you please tell us wherein the fraud lies?

Answer.—That's a good introduction, but I'm not going to take back any thing. But what is a fraud? That which represents itself to be something else. The so-called gravity separator is one, because it is no separator at all. The farmer has been made to believe that it was fully as good as the centrifugal separator; but if you will write to Professor Wing of Cornell University and get their bulletin, you will find that the figures recorded there in a large majority of results, were as high as six-tenths of one per cent. of fat in skim-milk. At our factory we found from four-tenths to one per cent. of fat in the skim-milk. Any deep testing can will skim just as closely. If you want to add water to milk to help to raise cream, go to the tin shop, get a can made, take it home and do it. Don't buy one that costs so much. I can take a can costing 25 cents and do just as good work as can be done with this aquatic can. Of course, just as good butter can come from such cream as from any other gravity process, but the skim-milk, being watered, is not fit for calves or pigs. At least, I would not feed it to mine. Another thing: the system is not new, but old, and is no more or less than any of the old gravity creamers, which never would skim closely. I have put away milk with one per cent. of fat in it, and failed to get any out of it by the gravity process. Your best course is to test your skim-milk with the Babcock. That will decide the question. Remember that the skim-milk is watered one-half.

Which system will get the most cream from milk, the separator or the creamery cans?

Mr. Smith.—The separator. There is no other way possible by which so much butter can be got from milk as by use of the separator, nor one that will produce as good butter, for the reason that the separator removes all the foreign matter. We have tested our skim-milk many times at the station during the past season, and, as a rule, did not find more than three-hundredths of one per cent. of fat remaining. The so-called aquatic separators are a fraud and humbug. Either employ the centrifugal separator or one of the deep-setting creamers. The submerged creamers are the best, such as the Cooley or Stoddard. They are operated on the same principle.

Please name the variety of grain that will produce most butter fat in milk?

Mr. Converse.—We cannot increase the per cent. of butter fat in a cow's milk if she has been kept up to her normal working condition. In Denmark, experiments were made with 150 cows, for the purpose of ascertaining whether butter fat could be fed into the milk of cows kept up to their normal working condition; the result showed that it could not.

Which make of cream separator will leave the highest per cent. of fat in cream; that is, which will leave it the thickest, and what ought the per cent. of fat to be in centrifugal separator cream?

Mr. Cook.—There are two or three good kinds. The De Laval, United States, Sharpless and others. A separator should skim very close, at the same time it should leave a cream having about 35 per cent. of butter fat.

Do you advise the use of a commercial starter for the ripening of cream?

Mr. Van Wagenen.—I suppose the most of you know what a commercial starter is. The theory of the starter is that we may always have the bacteria necessary to ripen the cream. When the milk is frozen, commercial starters are as a rule the best, because they are free from gas and are clean. There are two or three of them on the market, but I do not know that they are any better than a home-made starter made from pure, clean milk slightly soured.

Mr. Cook.—I would no more think of getting along without a commercial starter than I would without rennet for making cheese. A home-made starter is just as good when made of the milk from one cow, which has been heated up to 170 or 180 degrees to kill all the germs in it, held there for half an hour or more, then cooled down to 70 degrees and allowed to stand until it is slightly acid.

Mr. Van Wagenen.—The starter is almost universally in use in Denmark.

Why does it take so much more churning at some times, to get the butter from the cream from the same cows, than at others?

Mr. Cook.—As a rule, the trouble all lies in the failure properly to ripen the cream. It will not churn unless it has been properly ripened and mixed. No matter how it was raised. The best way is to take a quart of milk from your best cow; have it pure and clean; set it away and allow it to become slightly sour;

then add a small per cent. of it to the cream, which should be set in a jar and placed in another holding twice or three times as much water as the cream; warm that water up to 70 degrees and place the cream jar in it, and allow the cream to come up to that degree, then set it away at a temperature of 60 and hold it till it has a smooth, glossy appearance. It will then be ready to churn, but the temperature at which it should be churned will depend on how it was raised. Centrifugal cream will have to be churned at a lower temperature than that raised by the gravity process. About 60 degrees will be about right. Experiment and find out which degree is best.

If all farmers crowded their cows to their full capacity, what effect would it have on prices?

Mr. Cook.—I suppose that if every cow doubled her capacity this year there would be a depression in prices. In that case I would suggest selling off one-half the cows, thus saving the expense of keeping one-half of them. But that problem does not trouble me at all. We have doubled the product of our dairy within the last 10 years, and yet butter is bringing fully as high or higher prices than it did then. We are feeding our cows $15 to $18 worth of grain each year, but make a profit. Another point. The men who have cows that give 300 pounds of butter each year invariably obtain the highest prices for their product.

Is it wise for farmers to sell milk to a New York city contractor, thus closing cheese factories along the railroads?

Several Farmers.—No.

Mr. Cook.—I have watched the New York markets several years and find that the price paid for milk there is just about the same as it is worth for butter and cheese, with sometimes a slight increase for the by-product. But we have several times paid more for milk than the stations did. The only real value that the stations have been, is the stimulating of winter dairying, but the requirements of the station now are very rigid. Milk must be absolutely clean and be aërated. If a can comes to the station that is not just right it is sent back. I wish we factorymen had the same power those men have and could enforce it as they do.

Can we change the per cent. of fat in a cow's milk?

Mr. Cook.—Not if the cow is giving a normal flow and is fed up to her capacity. At times it will increase, then it will decrease, then drop back below her normal level. I have been trying during the last six or seven years to increase the fat in a herd of grade Holsteins, but have been unable to do it, so far.

Mr. Van Alstyne.—Recently I looked over our book where the Babcock tests are recorded, and found that the tests made every two weeks had not varied more than one-half of one per cent. The herd is made up of Guernseys and high grades.

How shall we prevent the butter granules from running off in the butter milk?

Mr. Van Alstyne.—Oftimes that is a great difficulty, but, if the granules are large enough so that they will stand on the surface of the butter milk, there will be no difficulty. Give the churn one or two more turns, then wait till the butter comes to the surface.

Will dry feed produce as much milk as will wet feed? Would you cut the coarse fodder?

Mr. Cook.—I suppose that means wet or dry grain foods. I have made some experiments in that line and came to that conclusion, having fed five cows on cut and wet feed; but I did not get any more milk from them. I found, also that every time I made any change there was a decrease in the milk flow; also that I got most milk when I fed the long uncut hay. It is better to let the cow wet the food with the saliva of her mouth; besides, she will eat the food more slowly.

What rate per gallon should the milk producer receive for city milk, with hay at $10, gluten feed $18 per ton, corn meal $15, bran $17? At these prices, which would be most remunerative—milk at 10 cents per gallon, cheese at 10 cents and butter at 22 cents per pound net to the farmer?

Mr. Pingrey.—I am not prepared to say, but I think we ought to get at least 12 cents per gallon. It is selling now for 10½ cents per gallon.

Mr. Ward.—I think the milk shippers are offering 10 cents for the season.

What are the farmers of eastern New York receiving per gallon for their milk, shipped to New York?

Mr. Moore.—Last month, at Mount Upton, Chenango county, we got $1.50 per hundred for our milk, sold on the pool system. It went to factories, some into butter and cheese, while some was shipped.

Mr. Fenner.—There are 12 gallons of milk in 100 pounds. You can easily figure the price per gallon.

I have a cow giving 30 pounds of milk per day which tests 3.25 per cent. of fat. If I change foods and make that cow give 10 pounds more milk, will it increase the butter-fat?

Mr. Smith.—No; provided the cow is in a normal condition. As a rule, such a per cent. of increase in milk from a cow testing so low in butter-fat, would result in a slight decrease instead of an increase in fat.

How low in butter-fat can milk be profitably produced?

Mr. Cook.—I don't know. It would depend on the quantity the cow gave. The law says that milk below three per cent. of butter-fat shall not be sold, and I do not believe that a cow giving milk below that per cent. ought to be kept. My opinion is that the cow that gives milk containing four to four and one-half per cent. of fat, with a good flow is the most profitable to keep. We are keeping cows that give about 3.6 per cent. fat, and getting nearly 7,000 pounds of milk per cow; but I am going to put in a herd of Jerseys for the purpose of ascertaining, if possible, which herd (our present one is Holstein-Friesian and its grades) will make a pound of butter-fat at the smallest cost. We have found that it requires about 250 pounds of butter per cow, each year, to cover all the expenses for labor, feed and interest.

Can milk be kept two weeks and give as good a test as milk kept but one week?

Mr. Cook.—There is no trouble in keeping it two weeks. We keep all of ours 15 days and make tests twice a month. We use bottles or cans having glass stoppers, because foreign substances will adhere to corks. There are several substances that are used to preserve the samples. Corrosive sublimate is as good a one as any to preserve the same till we want to test it.

Which is the more profitable, winter or summer dairying?

Mr. Garlock.—Winter dairying is the more profitable, provided we can get a factory that runs through the winter, but it will not pay if but one or two of us go into it.

Mr. Converse.—There are 10 cheese and butter factories in the town of Ellisburgh, Jefferson county, six of which have not closed their doors or banked their fires during the past four years. Our best dairymen discovered some time ago that they could not afford to feed dry cow boarders four months in winter, with nothing to show for it when spring came but experience and scrub cow society. So they began winter dairying. With good clean quarters, good care, good cows, good corn ensilage, some clover hay, wheat bran and oats and peas, we find that we can make as fine butter in winter as in summer, provided the milk is properly cared for and the butter is well made. We have also found that a good dairy cow which drops her calf, say November 1st, will give 1,000 pounds more milk during the year than she will when she freshens March 1st. Besides, the price of milk is from 20 to 50 cents a hundred pounds *higher* in winter than in summer. Another point, if cows are to go dry during a certain season of the year, it will be much more profitable for them to do so when the hot weather, short pasture and flies are here.

Mr. Cook.—Another point, in winter there is not any other farm work crowding, so that one can give more care and attention to the cows than in summer. But if best results from winter dairying are reached, we must have cows come fresh in the fall, and they should be good ones, by which I mean cows that will give not less than 5,000 pounds of milk—they should give 6,000 or 7,000 pounds—during the year, and we should be provided with milk-producing foods, such as Mr. Converse has named, while all the environment of the stable should be of the best. With such cows and such conditions obtaining, if one is so situated that he can draw his milk to a first-class creamery or cheese factory where butter is made in winter, there is no disputing the fact that winter dairying pays better than does that of summer.

What causes "flat" butter?

Mr. Van Alstyne.—I suppose that means butter lacking in flavor.

A Farmer.—Feed the cows some onions.

Mr. Van Alstyne.—They would add flavor, but not just the right kind. As a rule, foods have much to do with the flavor. Such foods as corn-meal, wheat bran and oats give best flavor. Ensilage also gives a good flavor; but at this time of year the milk from "stripper" cows is the cause of lack of flavor. When the milk of fresh cows is added to stripper milk a good flavor is maintained. That is one reason why Elgin butter has its reputation. In most dairies there, fresh cows are constantly being added, which with the foods they are fed keep up the uniform flavor of Elgin butter, which gives it its reputation.

Can 5.5 per cent. milk be successfully made into cheese?

Mr. Cook.—I have never handled any 5.5 per cent. milk, but cheese from richer milk, 6 per cent., has been made with a loss of only thirty-five hundredths of one per cent. of fat. I saw such a cheese recently; but such milk must be carefully handled. It is a mistaken and false notion that such milk cannot be made into cheese. It is also a false notion that milk at this time of year cannot be made profitably into cheese; but it is almost impossible to make a fancy cheese, one day with another, from every other day milk. It will be impossible with such milk to emulsify the fat so as to get out the moisture and get the caseine to hold the fat. In that case quite a per cent. of fat gets away in the whey. But a cheese made from very rich milk must be cured at a lower temperature than one made from poorer milk, for the reason that the high temperature starts the fat more quickly; one may not discern it with the naked eye, but a small magnifying glass will show it. For myself I can say I never worked milk during fifteen days that tested below 3.35 or above 4.2 per cent. In those instances there was no difference in loss of fat, showing that the caseine followed the fat in like ratio. Much higher, however, we know the caseine will drop a little behind the fat. The market shows that caseine is worth only two cents a pound, so that the loss through the difference in caseine in such milk is seen to be below consideration.

Can a pound of cheese be made from 8¼ pounds of milk?

Mr. Cook.—Yes, if there are solids enough in it. But I have never worked any milk as rich as that. But it is safe to assume that in such milk a pound of butter fat will make about two and a half of cheese.

Why does it take from 11 to 12 pounds of milk at our factory for a pound of cheese, if it can be made elsewhere from 10 pounds?

Mr. Cook.—Possibly it cannot be made from 10 pounds elsewhere. During the hot weather many factories will take from 11 to 12 pounds. When milk is inclined to be gassy it requires more. It is because, when the milk is in a certain condition more fat is liberated and gets away in the whey. I simply took 10 pounds as a basis in my talk to-day. The average with us during the year is a fraction over 10 pounds; late in the fall less than 10 pounds.

Neufchatel cheese.—Is there a demand for it, and is there profit in its manufacture? Tell us something of it.

The Reporter.—It is a small, soft, fancy cheese, put up in small rolls about three inches in length and one inch in diameter; then covered with tin foil. I do not know what its present price is, nor whether there is more profit in it than in our Cheddar cheese. There is a large factory at Antwerp, Jefferson county, where this cheese and several other fancy varieties are made; it is also made at Adams, Lowville, Fayetteville and at a factory near Middletown, Orange county.

What salt is best for dairying?

Mr. Cook.—There are several brands of salt made in this country which are good. We have used nearly all of them, buying in car lots. All of our best American salts are better than those imported, because they do not have the opportunity to become contaminated on shipboard.

What causes white curds that are found in butter?

Mr. Cook.—They are either bits of caseine or else flakes of dried cream. If the milk is creamed in the shallow pans we often find these specks. A good way is to cover the pans with pasteboard covers, or hang wet sheets in the room. These specks are mighty hard to get out of the cream and the best way is to cream the milk in the deep setting cans or by the separator.

What is process butter and where is it made?

Mr. Cook.—It is butter, the refuse from the stores in the west and elsewhere, melted up, purified with chemicals, re-churned, mixed with other butter, worked and packed, then put upon the market. The fraud is of selling it for creamery butter. In Utica there is much of it now being sold. It is difficult to detect the package owing to the color of the letters on the stamp. In this way the law is evaded.

What causes spots—mottled like—in butter?

Mr. Cook.—Nine times out of ten they are caused by an uneven distribution of the salt. Begin when the butter is in the granular form; sift on fine salt, distributing it evenly; use a wooden fork to turn it over; allow it to stand 15 or 20 minutes. Then work it. In this way the mottles or spots will be avoided.

Does it pay to aërate milk to be taken to a cheese factory in summer?

Mr. Cook.—Most assuredly. The town of Ellisburg, in Jefferson county, has 360 farmers who milk nearly or quite 6,000 cows, the milk going to the 10 or more cheese factories in the town. Had each one of those 360 dairymen used an aërator last year it would have increased the value of their milk enough to have paid for an aërator and left a balance of $600 for the town. In other words, the value of the milk product in the town would have been increased last year $2,000. And yet such care of milk is no more than is enforced by the milk shippers and condenseries.

A Farmer.—Suppose every farmer made butter only in the winter, how long before the price would be down?

Dr. Smead.—Possibly there would be a drop, but everybody is not going to do that. Then, too, with a good silo and ensilage butter can be made more cheaply in winter than in summer. Another point, a cow coming fresh in the fall will give 1,000 pounds more milk during the year than she will if she drops her calf in the spring.

Who is benefited by taking good care of milk that goes to a creamery?

Mr. Cook.—Every one of the patrons, the butter-maker, and lastly the consumers of the butter.

Of what benefit are the milk stations going to be to the farmers?

A Farmer.—We have one at Lafargeville, none nearer. I think it a benefit. It keeps up the price of butter and promotes competition.

Dr. Smead.—From my own observation I am satisfied that the station near me has benefited the farmers. The price of milk is higher, the cow is better fed and cared for, and the burden of the housewife has been lessened thereby. Besides, it has made another outlet, and anything that adds a string to the bow of the farmer is a benefit to him.

Mr. Cook showed a chart on which were stenciled figures showing the value of milk, taking 20 cents a pound for butter as a basis, for both cheese and butter, and said that all depended on the value of the milk in butter fats. If the milk is rich in fat, at present prices for milk, more money will be got out of it for butter, provided that milk is sold by the quart. If it is all pooled, such milk should be made into butter.

How should milk be cared for that it may keep in perfect condition for delivery to the creamery or cheese factory?

Mr. Dawley.—I like that question. Now I hope you will like my answer. Do not think I am "fussy." The questioner wants to know how the milk can be delivered in *perfect* condition and I will lay down the following rules:

The care of milk should begin before milking, by seeing that the cow or cows are clean, the stables and surroundings clean, as well as the utensils, and last but not least that the milker is clean.

Before commencing to milk, the cow's udder and flank should be wiped with a damp cloth or brush. By doing this, loose hairs and fine particles of dust and filth will be prevented from dropping into the milk pail, and much cleaner milk will be secured. The milking should be done with dry hands, and, to get the best results, should be done gently, yet quickly. Immediately after milking, the milk should be removed to a place where the surrounding atmosphere is pure, and then strained at once; for no matter how carefully it may have been drawn, there will be some dirt in it which should be strained out at once.

Air the milk frequently by dipping or pouring, or by the use of an aërator. With regard to aërators, if they are used properly and kept perfectly clean they are a good thing, but, if kept only half clean, they are a curse to the business, for a dirty aërator will spoil all the milk that goes through it.

In the very hot weather it will be necessary to cool the milk by the use of ice or water, but be sure that the milk is thoroughly aired before doing so, and do not cool the milk below 68 or 70 degrees, as it will keep quite sweet over night at this temperature and will arrive at the factory in much better condition for cheese-making than if it had been cooled to 55 or 60 degrees.

Always remember that milk requires airing just as much in cold weather as it does in hot or warm weather, for gases and animal odors are present at all seasons, and should be allowed to escape by airing immediately after milking.

Keep the milk in small quantities over night, and do not mix the hot and the cold milk. Send the night's and morning's milk to the factory in separate cans if possible.

When the whey is returned in the milk cans, empty them at once, wash with warm water, then scald and place them where they will get plenty of sunlight and pure air. See that the place where the milk is left over night is clean and away from anything that will produce a bad odor.

Occasionally, and the oftener the better, during the evening, the milk should be aired by dipping or pouring, thus preventing the cream from forming a leathery scum, which hinders the escape of taints. If the cream is allowed to rise and become exposed to the air it will become tough and leathery and will not mix with the milk, consequently a greater quantity of the fat is lost in the whey. The maker may get the blame when in reality it is the careless patron who is to be blamed. Do not leave the milk cans flat on the ground or against the side of a building over night, but raise them on scantlings or something similar, in an open space, so that the air will circulate freely under as well as around the can.

A very good plan is to rinse the cans with a pail of cold water before putting the milk in them. See that your cows have plenty of good succulent fodder when the pastures are getting short, with free access to salt every day, and an abundant supply of pure water. As there is 87 per cent. of water in milk it is very essential that the water should be pure.

Causes of Tainted Milk.—Some of the causes of tainted milk are: poor, decayed fodder; dirty water, whether used for drinking water or for the washing of utensils; foul air in the cow-stable or cows lying in their manure; lack of cleanliness in milking; neglecting to air the milk rapidly directly after milking; lack of cleanliness in care of the milk, from which cause the greater number of milk taints arise; mixing fresh and old milk in the same cans, and dirty or rusty tin pails and cans.

It should always be remembered that pure milk can only be obtained from healthy cows, pure feed, pure water, pure air and clean handling. Every patron's cash receipts are affected by the way his brother patrons produce and handle their milk. Hence the necessity of each adhering to sound rules based on sound dairy sense. In not a single first-class factory in the land are good prices obtained for the product except where all the patrons practice thorough cleanliness in the care of milk. It is a matter of profit for each to do this.

SUGAR BEETS.

From what information you can get and have received, are the farmers generally satisfied with the results obtained from sugar beet cultivation?

Dr. Smead gave some results as reached in his county near Seneca lake. Last year most of the farmers were satisfied with results. This year the drouth has shortened the crop, but he has learned that the percentage of sugar is greater this year than last, but that as the price will be no higher than it was last year, the growers object. All in all, he thought the farmers would continue raising them. There were about 40 acres grown in his locality this season (1899), the crop going to Binghamton.

Mr. Cook.—The sugar beet is a new money crop and no doubt will prove a good thing in some localities, if properly grown. But I do not believe any of you will get rich all at once by growing it. I would not rush into it too far at first; but, don't think I want to throw cold water on the enterprise. It is well to try it; then note results.

What success have our beet sugar factories had in increasing their output and numbers?

Mr. Cook.—Mr. Rogers of the Binghamton beet-sugar factory, said they were greatly encouraged. Their crop last year was 30,000 tons, against 20,000 tons the year before, while next year's tonnage will be still larger. Doubtless there will be one more factory built in the State this year, which will be at Lyons, making three factories in the State. The growing of sugar beets adds another money crop for the farmer, and I think it will grow and crystallize in a short time so that we will know what we are doing.

Mr. Harmon.—We grow cabbage here, which is a better crop than sugar beets ever will be with us.

Is the Unadilla Valley suitable for growing sugar beets?

Mr. Moore.—They will grow here and give a good per cent. of sugar, if the season is favorable. I sowed some seed last spring but it did not grow; the drouth was the cause of failure.

Which is the best money crop, sugar beets or potatoes?

A Farmer.—Sugar beets; but it is more work to grow them unless one has a weeder. We got $50 last season off an acre and a half.

Two or three farmers said that, all things considered, there was more money in potatoes at 25 cents a bushel than in beets.

Another farmer said he got $50 last season off an acre. The yield was 10 tons; but there was a majority of two to one in favor of the potatoes at South New Berlin.

Mr. Cook.—I think, as a rule, we have not been educated up to the point of successful sugar-beet growing; I also believe that we are to grow more of them, but that the work will be largely done by foreigners; and I hope the Legislature will keep up the bounty appropriation just as long as its conscience will permit. Let us raise all we can and save as much of the money as we can which we are yearly sending abroad to purchase this crystalized sunlight.

What is the expense per acre of growing sugar beets?

Mr. Cook.—Have any of you here grown them?

O. E. Wolcott of Corning.—I grew 20 tons of beets per acre at a cost of $30 per acre. I used fourteen pounds of seed.

One-half the cost will be saved if the ground is plowed early and harrowed several times to kill the weeds. Sugar beets pay better than any other crop grown on my farm. One advantage is that the crop is sold before it is grown, while the soil is left in fine condition for succeeding crops. One firm in Syracuse grew 132 acres last year and this year will put in 300. Around Hornellsville, some are offering to take 50 acres. Mr. Rogers at Binghamton had 37 acres. The total cost was $655,52; the yield was 14½ tons. After paying for fertilizers and every item of cost, the expense was $25.77 per acre. All work except the thinning can be done with a horse. The hardest thing is to get a good stand and plenty of seed should be used; and do not put it over an inch deep. Cultivate with a small toothed cultivator. The secret of success is never to let the weeds get a half inch high. A good fertilizer is one containing 4 per cent. nitrogen, 8 per cent. phosphoric acid and 10 per cent. potash.

Will Mr. Rogers, who is present, give us some data as to results reached from the sugar beet crop, at the Binghamton beet sugar factory since it was opened?

Mr. Rogers's answer is condensed. He is president of the Binghamton beet-sugar factory and has had much experience with sugar-beet growing and the manufacture of beet sugar. He has used every means for the purpose of ascertaining if the growing of the beet by the farmer, and the manufacture of sugar from them could be made profitable. The results so far have proved highly satisfactory, and his company has been enabled to increase its contracts for next season's crop nearly 100 per cent. over those of last year. He said that the number of beet-sugar factories and the manufacture of beet sugar has nearly doubled in the United States during the last two years. The average production per acre in the Binghamton factory's bailiwick last year, although it was one of the driest seasons he has ever known, was fully two tons per acre more than it was the year before, which shows that the farmers had become better educated in the knowledge of how to grow the sugar beet. There is no crop that will pay better, if one has a fairly good soil, than will sugar beets. It is possible to grow beets, and get good pay for our labor, the fertilizers used, and the interest on the value of the land, and give a good profit. All the work done was done with a good profit. All the work was done with a horse, the rows of beets being twenty inches apart and the plants thinned to eight inches in the row. Two years ago Mr. Rogers grew twenty acres at a total cost of $27.02 per acre. Last year he grew thirty-seven acres at a cost of $17.27 for labor and interest, to which should be added $5 for fertilizer and $1.75 for seed per acre.

"But," said Mr. Rogers, "we want good land, well fertilized, and the beet must receive good care. It will not pay to expend money and fertilizers on poor land. It does not cost any more to grow a crop of 14 tons or more per acre than it does to grow 10 tons. Therefore, have the ground rich, plowed deeply and well pulverized, so that the seed-bed will be fine. This enables the seed to germinate. If the ground is inclined to bake before the seed germinates, go over it with a wire-tooth horse-rake. It is better than is the weeder, because the teeth draw more flatly over the ground."

What formula of commercial fertilizer do you recommend?

Answer.—One having 4 per cent. of nitrogen derived from nitrate of soda or dried blood, 8 per cent. of phosphoric acid, and 12 per cent. of potash, using either the muriate or the sulphate. When the land is good, well fertilized and the crop well cared for, there can be a profit of $15 to $25 per acre realized.

Mr. Rogers, to show how the growing of the beet has increased, said that Smith and Powell of Syracuse, grew, two years ago, 15 acres, and last year 130 acres, and they have contracted to grow 300 acres this year. They have grown cabbage and nearly all other truck crops, but they had told him that they had never grown a crop so profitable as sugar beets.

THE SHEEP-FOLD.

What about sheep as moneymakers on a farm. Best breeds and management?

Dr. Smead.—There are a great many things about sheep which the best breeders do not yet know. To breed sheep successfully one must know the sheep and its habits and how to breed and feed it. Then, too, one must select the breed he likes best. Having selected it, feed and care for it as it is cared for and fed in its native home. Nearly all our sheep breeds come from England.

There they are fed succulent foods such as roots. Here we give dry feed and grain. The shepherds of England feed but 16 bushels of grain to their flocks, while we feed an average of 47 bushels. If profit is to come, we must aim at a certain production, which should be mutton, or, rather, lamb. So select the breed that will produce the most and best, first selecting the one you like best. When all the knowledge of the sheep needed has been obtained, there will be money in them. But one must constantly make selections of the breeding ewes, keeping those that are the best, so as to get the most lambs, which should be dropped as early in the season as possible.

What breed of sheep is best for all purposes?

Dr. Smead.—The one that the man under his individual conditions can make the most money out of. But the soils and climate of this State are favorable to the keeping of any and all breeds, so I am going to say that, if one will study the individuality of either one of them, and feed and care for it as he should, money can be made from it. It will depend, not on the breed, but upon the man who handles it. But be sure to have the breed or else keep scrubs, and scrub it through life.

What is the best variety of rape for sheep?

Mr. Ward.—Dwarf Essex is the best variety. I have been reported as saying that Dwarf Victoria was best; I have never said anything of the kind. If anybody asks you to feed it, do not do it, but get the Dwarf Essex seed which you may obtain of William Pennie, Toronto, Canada.

How many sheep can I keep on the food one cow ought to have, keeping both in good condition?

Dr. Smead.—It would depend on the sheep, its breed; the cow, and her breed. In my boyhood days the rule was ten sheep for one cow, both being grades. In those days we saw many dead sheep lying around the barn yard, and later, when the March storms came, many dead lambs. In those days it was possible for ten sheep, weighing 100 lb. each to go through the winter for about the same cost as a cow weighing 1,000 pounds. To-day it cannot be done. It requires food to support ewes that are to produce lambs. Such ewes as I keep weigh about 140 pounds, so that both being well fed, five sheep in the place of one cow would be about the ratio I would name.

What do you consider the best or most proper grain for sheep?

Mr. Ward.—I feed ensilage once a day; the other ration is one made of wheat bran and ground oats with perhaps a little oil meal added. I should never feed corn when I had ensilage. Unless one wants to fatten sheep, do not feed them corn. I have experimented as much as has any man in the State, in feeding corn to breeding ewes, and I am going to say that I never fed it except at a loss. I do not believe that any man can feed corn to breeding ewes without endangering the loss or injury of their udders. I have tried it, and, as a result, had to take them out to the woods and never bring them back again.

Would you advise breeding ewes the first year of their lives?

Mr. Ward.—I would never breed ewes before they were a year old. There is always a greater or less loss of lambs from such ewes.

How old should a ram be when used in the flock?

Mr. Ward.—One year; but five years is better.

What breed of sheep are best for winter lambs?

Mr. Ward.—I suppose by the question that lambs fit for markets not later than February are meant. For such I would have a large per cent. of Dorset blood. But there is fully as much in the feeding as in the breed. Such lambs must be fed and pushed constantly. Feed oat flakes, wheat bran and oil meal and there should be some sugar fed. I know of a man near Rochester who keeps 100 breeding ewes and sells his lambs in New York for $10 each.

Which breed of sheep is most profitable for both mutton and wool?

Mr. Ward.—There is no good sheep for both mutton and wool. Either make one or the other a specialty: For mutton I would not keep the Dorsets but some one of the dark-faced breeds.

Which is the best way to make an ewe own her lamb?

Dr. Smead.—As a rule, one way is to take the ewe entirely away from the remainder of the flock. In a day or so she will own the lamb. If her lamb dies and you wish to substitute another, take the skin off the dead lamb and put it on the back of the adopted one. As a rule, she will own it, and, within 24 hours, the skin of the dead lamb my be removed, while the ewe will continue to own the lamb as her own.

Is cabbage a good food for sheep?

Dr. Smead.—I shall grow some next year to feed sheep unless the price gets too high. To-day the price is $10 per ton, but they weigh like lead, the head averaging five pounds, the bulk going to the sauerkraut factories. Cabbage at $10 per ton, however, costs too much for sheep food, but is an ideal food for the lamb, and, after the heads have been removed, if the lambs be turned on to the ground they will do very nicely. The Danish variety is the best for shipping. It does not pay to fight the worms when cabbage are raised in a commercial way, for the reason that there are no more butterflies around a ten-acre field than around a small patch in the garden. Persian insect powder blown on to the plant with a bellows will kill the worms.

How long is it since lambs have been as high in price as they are now? What is the prospect for higher prices?

Mr. Cook.—The outlook for such lambs is now very good, fully as good as before the war.

Which would be most profitable, 10 sheep or one cow, including price of labor?

Mr. Van Dreser.—Just now, I would put on the sheep, but would raise some one of the mutton breeds, and make lamb-raising—not wool or old mutton—the object. Still, I should keep a few cows, if I could, because I do not think it good policy to have all our eggs in one basket.

What is the best grain for ewes which are suckling lambs?

Mr. Ward.—We are now feeding our sheep ensilage and bean pods. Wheat bran, ground oats and a little oilcake are good grains to feed sheep when grain is substituted.

Which is the most profitable at present, sheep or cows?

Mr. Barlett.—It will depend on the man. We are all differently constituted. Some of us prefer one breed of cows or stock, another man another. If a man prefers Guernseys, he should insist on that breed; the same is true of Shorthorns, Jerseys or Ayrshires. It is so with sheep; but one should get the breed he most prefers, and I believe there is as much money in a flock of good sheep as in a herd of dairy cows; by which I mean a herd of *good* cows. But one must be acquainted with the sheep, its habits and diseases. They are very sensitive animals and are subject to many diseases, and when disease gets into a flock it is very hard to eradicate it and bring the sheep back to normal conditions. We may doctor a sick cow and bring her back, but it is hard to do so with a sheep. Sheep will pay with one man and be a loss to another.

POULTRY POINTERS.

To Mr. Van Dreser.—Is animal meal what it is "cracked up to be" to feed laying hens?

Answer.—Animal meal is very good. The hen craves meat. If she does not get protein meat she will pick feathers off from another, or another's combs. Dried blood or meat scraps make good rations.

How much green ground bone ought to be fed to 20 hens, and how often?

Answer.—We feed about half an ounce twice a week, in the morning ration, mixing it with the grain food. It costs but little and may be bought in Schenectady.

What breed of hens do you keep?

Answer.—The White Leghorns, single comb, which we keep as long as they respond in eggs, at a profit. We have some that are six years old.

Will Mr. Van Dreser give us his net profit per chicken?

Answer.—We made a whole lot of mistakes at first, because we did not keep laying hens and had not studied their makeup. When we had become educated, we cleared $1 per hen. Last year, they paid us more than that, but it did not all come from eggs;

some pullets went to San Francisco, at $3 each, and we have sold roosters for $25 each. Then too, we get pretty good prices for eggs, having received 47 cents per dozen for them, this winter.

Will Mr. Van Dreser tell us how his hen houses are ventilated? Also, how many hens he keeps in one flock?

Answer.—We have six-inch pipes that come to within six inches of the floor and which terminate in a cowl in the roof. There is a damper near the lower end, which is kept closed during the night and opened in the morning. These tubes are made of galvanized iron. They are 30 feet apart. This system keeps the rooms dry and the air pure. No frost accumulates. We keep 50 hens in a flock.

How much hen manure do you get, and how do you save and utilize it?

Answer.—The hens are making about fifty bushels of manure per week. Land plaster is plentifully spread on the platforms under the perches, to absorb moisture and prevent the loss of nitrogen, and the platforms are carefully cleaned twice a week. The manure is kept in barrels in a dry place and run through a threshing machine cylinder in the spring. When the winter wheat has been sown, the finely prepared hen manure and plaster is broadcasted over the fields.

What pattern of incubator do you use?

Answer.—"Prairie State." We have enough of them to incubate 1,400 eggs at a time, about 80 per cent. of which hatch.

Why are eggs less fertile in winter than in summer?

Answer.—Because the hens are kept indoors more than in summer, and therefore do not get proper exercise.

At what time of day is it the best to feed warm mash to poultry?

Answer.—We feed it in the morning. Prefer that time to the noon hour.

What amount of land is required to raise sufficient sunflower seed for 100 hens? How much animal meal in the morning ration for 100 hens?

Mr. Van Dreser.—We put in a half acre of sunflower seed in drills, one seed in a place, 18 inches apart, rows three feet apart.

We had 65 bushels of nice, clean seed; sufficient for our 2,500 or 2,600 hens, but it must not be fed too heavily, as it is very laxative. Three pounds of animal meal to 100 pounds of mixed meal will do for 100 hens.

Do you think that chickens ought to be in places where hogs or other animals are kept?

Answer.—I wouldn't do that. No respectable hen ought to be compelled to associate with hogs, nor would I allow a hen to roost on a carriage top. Give them a place by themselves.

Will hens lay in a room where water freezes at night, if they have the proper foods?

Answer.—I think so, if the hen house is not cold, so as to cause the hen to freeze her comb.

What is the best feed for laying hens in winter?

Mr. Converse.—It is a physical impossibility to make a fat hen lay eggs. They must have protein foods. Our plan is to feed a warm mash in the morning, made of a mixture of 200 pounds of coarse wheat bran, 200 pounds of ground oats and peas, 200 pounds of yellow corn meal and 100 pounds of animal meal. It is all mixed thoroughly and wet with skim-milk if we have it; if not, warm water is used. The whole grain ration is composed of one part of corn, one of wheat. This is scattered in the straw on the floors, and the hens allowed to work for it. They should also have some vegetables such as beets and cabbage; also something to make shell, such as ground oyster shells; also dust baths; and there should always be provided an abundance of pure, clean water.

Dr. Smead.—Mr. James Rice of Yorktown, well known to many of you as an institute speaker, is a breeder of poultry on quite a large scale, having at this time about 600 white, single-comb Leghorns. His winter ration is whole wheat, three quarts to 50 hens, sprinkled broadcast in whole straw on the poultry house floor. The straw is about a foot thick and the hens are forced to work for the wheat, which gives them plenty of exercise. This for the noon meal. Corn is fed at night for the hens to "go to bed on," and for the purpose of keeping up the grinding process in the crops.

For the morning meal a mash made from the following formula is fed: 100 pounds of ground oats, 200 pounds wheat bran, 100 pounds corn meal and 50 pounds of Bowker's animal meal and 50 pounds old process oil meal. This is thoroughly mixed and a warm mash made of it, either by the use of warm water or skim milk, and only enough fed to be eaten cleanly. Care is also taken to have the feeding troughs perfectly clean and sweet, and all the pure clean water kept in a handy place but where the hens cannot get earth or straw in it. Ground oyster shells are also used for shell material and dust baths are placed in every room. Early mown clover—aftermath, is best—cut finely and steamed, is also fed. It is an excellent nitrogenous food for the hen, as the egg is largely made up of albumen.

Mr. Litchard.—The last thing I did before leaving home was to mix the hen ration, which was cracked corn and wheat. In the morning we give a bushel of ensilage to 100 hens; beets are also good for laying hens; so are cut bone and cracked oyster shells; also meat scraps; if you live near a market buy refuse meat, grind and feed it.

What is Mr. Van Dreser's ration, aside from unground grain, millet, wheat and sunflower seed, for his laying hens?

Mr. Van Alstyne.—Mr. Van Dreser has gone, but, by reference to a memorandum, I find it to be 100 pounds of oats and peas, ground, 100 pounds of wheat bran, 100 pounds wheat middlings with 50 pounds of Bowker's animal meal. This is all mixed and enough wet with hot water and sprinkled in the V-shaped troughs to last about ten minutes. It is all eaten up, and the troughs kept clean. This is the morning ration. The grain ration is fed at noon, and corn for the supper meal.

What is the best food for young chickens?

Dr. Smead.—I don't know. Some of you chicken-raisers tell us. Don't sit here, "keep mum," then go out and discuss the question.

Mr. Watson.—Hard boiled eggs to begin with for a few days, then Johnny-cake, followed with cracked wheat.

Mr. Converse.—They should have some mineral matter. The young chicks will pick at something white, so I give them pounded egg shells.

A Farmer.—Old earthen ware, made fine, makes a good grinding food for young chicks.

Give some ideas for making a home-made chicken brooder?

No one present knew how to make a brooder. Mr. Van Alstyne said that he believed it would not pay to attempt to make a home-made affair.

Which makes the best hen house, stone or wood?

Mr. Ward.—Wood, every time, for cows, horses, sheep, hens or anything else.

Should hens be shut up when the weather is cold, or be allowed to run about?

Mr. Ward.—If one has a shed not open to the weather, perhaps it would be better than a very warm hen house. Give them exercise, but in no exposed place.

How is it best to give water to hens?

Mr. Everett.—We water our hens in a galvanized iron pan two inches deep. The object is to have the pan so shaped that the hens won't get into it.

What will make hens lay eggs?

A Lady.—Plenty of good food.

Dr. Smead.—As a rule, the ladies are the most successful poultry-raisers, and I wish the lady would tell us.

The Lady.—I can't talk.

Dr. Smead.—Then I will give my method. First have the hen house warm, light and dry, and free from vermin. Then feed wheat, skim-milk, meat scraps and vegetables, scatter the grain ration in the litter on the henhouse floor and make the hens scratch and work for it.

How can you distinguish a hen that is laying eggs, from one which is not?

Mr. Converse.—By the color of her comb, and the way the hen appears when you go into the pen. Sometimes a hen gets too fat; in that case she presents a sluggish appearance.

Is poultry, as it is usually kept on the farm, profitable? If not, how shall it be made so?

Mr. Stevens.—I do not know any branch of stock farming more profitable than poultry, nor of any better markets than those along this river—the Hudson. We are sending money to Europe for most kinds of stock, which ought to be kept at home. Select the best breeds for eggs, care for them well, feed them properly and you will reap profit from poultry. There are several good breeds. The white and brown Leghorns and the white and barred Plymouth Rocks are among them.

Which is the best pattern of incubator?

Mr. Converse.—There is but little difference between the values of three or four varieties. The "Prairie State" is a good one, but there are others just as good. They are very much like the mowing machines; as a rule, all are good. But there are some cheap incubators being advertised. Don't buy one of them unless some one whom you know has experimented with it. Go slow. Buy the best.

Which is most profitable to use in hatching chickens, the hen or incubator? Which is best?

Dr. Smead.—When we kept Brahmas we had no difficulty in finding a sitting hen. The Leghorns will not stick to the nests. If one is going to make a business of raising chickens on quite a large scale, I would buy an incubator. Sometimes, I think I will buy one for the neighborhood and let everybody use it. An incubator, however, will not run itself, so it must be looked after by someone who will follow the directions of the maker, and it costs no more to run one having a capacity of 200 eggs than one of a less number, and I believe that the incubator is the coming "hatcher," whether for a large or small number of eggs. There are several patterns, all which are good, the "Prairie State" being as good as any.

Mr. Rice.—All will depend. If one is engaged quite largely in poultry-raising, and will give proper attention and care, use the incubator and brooder. If only in a small way, say 50 or 100 chicks which are to be given the usual farm care, get a few good old fashioned Barred Plymouth Rocks, and give them the job of hatching the chicks. This breed of hen will stick to the nest till the last chick comes out of the shell, while no better or more devoted hen mother ever clucked or cackled. Then, too, when she has done laying eggs and rearing chicken families, she will be found one of the best of fowl for the table. But do not attempt to hatch chicks by using a white Leghorn. She will start in with a great deal of hurrah and preparation, but in a few days will leave the nest and begin laying eggs again. In that respect, she is quite like some men who are never contented to stick to one sort of work more than a week at a time. But the Barred Plymouth Rock is not built on that plan nor along that line. When it comes to going on the nest and hatching chickens she will always be found a " stayer."

What breed of poultry pays best on a small farm?

The Reporter.—The one that pays best on a large farm. Why not?

Mr. Ward.—Mrs. Hollister recommended, yesterday, the Buff Leghorns and gave statements of very extraordinary yields. Of 20 breeds she has found this one the best.

Are oats a good food for hens? If not, what are the best foods for laying hens?

Mr. Wall.—Oats are best when ground with corn and fed in a mash, to which may be added equal parts of bran and middlings, vegetables, cut clover or clover meal, and some animal food. Grit in some form and pure water are essential. Wheat is the best whole grain for all seasons. Corn in moderation is a good ration for the evening feeding in cold weather. It pays to warm whole grain and feed in a litter.

What is the comparative cost of a pound of chicken with other meats on the farm?

A Farmer.—I have found that, one year with another, a pound of chicken can be purchased as cheaply as a pound of any other meat on the farm, and I am satisfied that a pound of it pays twice as well as does a pound of pork. I began a few years since with fifty hens, and have increased the flock to 500, and find I can make $1 net per hen. It does not cost me any more to keep eighty hens than it does to keep one cow. If I can get $1 per hen, you see I am getting nearly three times as much from the hens as from the cow. I have 150 White Leghorns, the others are mixed, but the record for the entire flock is nearly 200 eggs each per year.

What is the best yield of eggs from 50 hens?

Mr. Cook.—For one I will say I do not know, but I believe that Mr. Wyckoff of Tompkins county, holds the record from 100 or more. No one present could give a report from a flock of fifty.

A Farmer.—I know a minister whose Plymouth Rocks produced 215 eggs each last year, and they are not ranked as special-purpose fowls, either.

Mr. Ward.—I mistrust there is something the matter with that minister's bookkeeping. The best record I have ever heard of, was 198 eggs per hen. I guess that some other hens must have got in and laid in those nests.

What is the cause of hens pulling feathers, and is there a cure for it?

Mr. Chapman.—It is a habit with some hens. When one has it, cut off her head. As a rule, however, it is caused by a want of albuminoids in the food. Give them some oil meal, meat scraps or other like foods; cut clover in winter is also a good food.

What are the best methods of preserving eggs, and how long will they keep?

Mr. Ward.—We don't want to preserve eggs, but eat or sell them as fast as they are laid. We have heard enough about cold-storage eggs. One can hardly go into a hotel and get fresh eggs. Keep and feed the hens so that they will lay right along.

Mr. Chapman.—If it were not for cold storage, eggs could not be given away in summer. But eggs may be preserved in lime water, although the system is too expensive.

A Farmer.—I have limed eggs, and they came out in such fine condition as to defy inspection. I had no difficulty in selling them for 22 cents per dozen.

Mr. Ward.—Possibly, but I would rather have newly laid eggs, and I believe that most customers prefer them to salted, limed or cold-storage eggs. As to the keeping qualities of preserved or cold-storage eggs, I know nothing, but I think that such eggs would have to be eaten very soon after being exposed to normal conditions.

A Farmer.—Is it essential to feed oyster shells in the summer?

Mr. Gould.—Yes; they will eat as many in summer as in winter.

Mr. Laird.—I find that our hens do not eat nearly as many shells in the summer as in winter; another thing, unless a hen is laying eggs she will not eat many shells.

Mr. Cook.—It will depend on the soil and conditions; if the hens have a large run and the soil is not too clayey the hens will not eat many oyster shells in summer.

What is the best general purpose fowl?

Mr. Ward.—We do not want any "general purpose" fowl. Get a special purpose fowl. We can't ride two horses in opposite directions at once. Either have an egg-producing or meat-producing hen.

Mr. Converse.—Nor do I. I have no use for general purpose hens, cows, horses, hogs, or dogs. Special purpose animals or fowl is my motto every time.

What effect has venetian red on eggs?

Mr. Cook.—I don't know what the writer means by the question. Perhaps he thinks that to paint the hens red he can get Easter eggs that way; but I will not paint my White Leghorns.

Which breed of turkey is the most profitable?

Mr. Chapman.—The bronze; they may be made to weigh 20 pounds each.

Which breed of hens are best for egg production?

Mr. Chapman.—In our town, one may go its whole length and find nothing but White Leghorns. The Plymouth Rocks are a hardier bird, but not so valuable for egg production.

How best to manage turkeys the most profitably?

A Farmer.—Feed them.

Mr. Cook.—I am told there are a thousand turkeys near here—Rodman—that are to be slaughtered for Thanksgiving. Will some one tell us how to feed turkeys?

A Farmer.—We begin with bread and milk, which is continued about four weeks. Then we feed grain, beginning with wheat. Later on other grains are fed.

A Farmer.—If you wait till to-night I will bring my wife down, who will tell you all about it. She is at home to-day, picking turkeys. It is a trick to raise them, and do it well, but she knows how to do it.

What is the best food for young turkeys?

Dr. Smead.—My wife raises turkeys. She has fed bread, but occasionally a turkey would go wrong, then die. Now she feeds a custard with the sugar out, the first month; this is followed with oatmeal later. When the large feathers begin to grow, the birds are troubled with what we term "droops" and die. It is a critical time and I am convinced that it is caused by a want of protein food, so we feed ground fresh meat scraps fined in a sausage cutter. It seems to meet the requirements of the case very well indeed.

What is the best way to feed sour milk to hens?

Mr. Cook.—Sour milk, if the curd is in it, is a valuable protein food, for the hen, but it ought not to be allowed to become too sour. Place it where the hen can eat it, but do not feed too much, and be sure to keep the feeding dishes clean.

What shall we do to cause hens to molt?

Mr. Ward.—Sunflower seed is the food used by Mr. Van Dresser, to hasten the molting season.

How large should a hen house be for 100 hens?

Mr. Converse.—We allow about four square feet per hen, when the hens are kept continually in the building. We keep 50 in a flock.

What causes "gapes" in chickens and what will prevent them?

Mr. Van Alstyne.—Gapes in chickens come from a worm in the soil, and it is said the gape worm comes from the angle worm, and it is most prevalent when the chickens run on old angle worm infested ground. When the coops are placed on sod ground or on board floors, gapes are seldom seen. Air-slaked lime sprinkled lightly on the chicks will cause them to sneeze out the worms, at times, and they are sometimes removed by the use of a feather.

Is it not better to feed soft food to hens at night than in the morning?

Mr. Stevens.—I have experimented on both lines, with both the American and Asiatic breeds, and have concluded to feed the warm mash in the morning. At noon, grain, made of a mixture of two-thirds oats and one-third corn. I do not know that I would make any difference between white and yellow corn, except for exhibition purposes. For those I would feed white flint corn. It is known as "white sanford."

Are beets better for hens than flat turnips? Will hens eat turnips as well as beets?

Mr. Rice.—I think a ton of beets is worth more to feed hens than an equal weight of flat turnips. They are sweeter and juicier. The actual difference in food nutrients, however, is very slight. Figuring from analysis, we find that in a ton of mangels there are 2.2 per cent. protein, 10.8 per cent. carbohydrates, 2 per cent. fat; flat turnips, 2 per cent. protein, 14.4 per cent. carbohydrates, 4 per cent. fat. The nutritive ratio for the mangels is 1 of protein to 5.1 carbohydrates, and for flat turnips 1 of protein to 7.6 carbohydrates. The real difference is more on account of the tenderness and fine flavor of the beets. Notwithstanding all this, we always raise plenty of turnips for the hens, because it is so much cheaper to produce them. In fact, we have nearly ceased raising beets. They require the whole season to grow. They must have exceptionally rich ground to make a good crop, and of necessity need considerable care and some hand weeding. They are expensive. The turnips we sow broadcast after early potatoes or in the corn or young orchards at the last cultivation. They hustle for themselves. All we have to do is to pull and top them. They are therefore cheap; while hens usually prefer raw beets to raw turnips; they like both. Cooking greatly improves the turnip; when it is boiled and mixed in with the ground feed it makes a very savory mash. The fowl like it. If you don't believe it, try it.

THE DAIRY COW—CARE AND FEEDS.

Do you recommend the keeping of cows in the stable constantly in winter?

Mr. Terry.—Not if they are milch cows. The modern cow is purely an artificial one, and she should have abundance of fresh air, and exercise. We used to hear it said that we must keep cows constantly in the stables in winter, in order to secure more butter fat, but there is something else to be considered beside butter fat, and that is the cow's health and that of her progeny.

Are raw potatoes good to feed milch cows? If not, why not?

Mr. Terry.—Yes; in small quantities; not more than four quarts per day at first. Possibly, later the quantity may be slightly increased. But they are a starchy food and should be properly balanced with some protein foods.

What shall I feed, if I have timothy, in place of clover?

Mr. Cook.—You all know the difference between timothy and clover. The latter contains about twice as much protein as does the former. The cow must have the protein. It is not in timothy hay. If you feed that, you will have to feed more wheat bran, gluten, linseed or some other protein grain, than if you fed clover. I could not answer the gentleman's question except I saw his hay.

What grain ration would you feed with corn stalks and oat straw now, to cows coming fresh in the spring?

Mr. Litchard.—Wheat bran, linseed meal and some ground oats. Cornstalks have a nutritive ratio of 1 to 17, so something must be fed to narrow the ration. These foods will do it.

About what per cent. of loss is there when feeding ripe whole grain to cows?

Mr. Converse.—I don't know just what the question means, unless it be unthreshed grains. As a rule, more feeding value may be gotten from ground grains; but I should mix it with the coarser fodder, as both are more easily and fully digested.

A Farmer.—I believe there is a loss of fully 50 per cent. in feeding such unthreshed grain, over that ground. If you had ensilage, sprinkle ground grain on it. We have fed it to horses during the last ten years, with good results. When I say ensilage, I mean that made from matured corn and stored in a frost-proof, air-tight silo; not ensilage that is sour or moldy.

How large ration do you recommend for a good butter cow?

Mr. Baker of Schenevus.—Once we have a good cow, she should be fed all she will eat, assimilate and digest of good milk-producing foods, no more; if she is, the extra food will be thrown away. We should begin with the calf by feeding it properly, and the foods should be those that will stimulate the milk producing organs and thus develop them, else they will remain dormant, the milk-producing functions destroyed in part at least, and the calf be forced to lay on fat. When this course is pursued with the calf, the habit cannot be changed when cowhood has been reached.

Mr. Van Alstyne agreed with Mr. Baker, and said he had been breeding up his herd, with the view of producing butter fat and had got the herd up to 5 per cent. fat. That point having been reached, he did not want to go higher. He did not believe it possible to maintain a higher per cent. of fat and keep up the milk flow. As a rule, the Jersey breeders are looking after more milk and a little less fat; while the Holstein breeders are after less milk and more fat. If however, he can secure 7 per cent. cows together with a proportionate quantity of milk, when compared with good 5 per cent. cows, he was ready to invest in them.

Mr. Cass said he disagreed with Mr. Van Alstyne. He had cows that are giving a good flow of 7 per cent. milk; if he could get more than that, he wanted it.

Mr. Van Alstyne.—How many pounds of milk do your 7 per cent. cows give per day?

Mr. Cass.—I don't know; I don't weigh milk, I weigh butter; but they give enough milk to make 3 pounds of butter per day.

Can we afford to feed the cow on hay and grass alone?

Mr. Cook.—I would not want to feed the cow alone on either one, but I should want to see the hay. If there were a reasonable amount of clover in it, I think one could feed a full ration of hay. If you have no ensilage, about 20 pounds a day would be a proper feed. The question is a very indefinite one.

Hay is $11 per ton, mill feed $18; which had we better feed for butter?

Mr. Van Alstyne.—It would depend on conditions. If the cow is fresh in milk and is worth anything, and we want to make milk in winter, she certainly ought to be fed grain. Whether it would pay to feed grain in summer would depend on the pasture. If it was very short, and the cow a good one, it will pay in the long run to feed her some grain.

Should cows be watered directly after being fed?

Mr. Van Alstyne.—I don't think that will make much difference. If the cow wants water, she will drink it; if not, she won't. Nor do I think it makes much difference whether she has it twice or three times a day.

Mr. Cook.—Water a cow twice a day, and I believe that, if we can have the water pure and clean, the place to water the cow is in the barn; and, theoretically, the water ought to be at a temperature of 98 degrees, but the cow seems to prefer it at a temperature of 50 to 60 degrees. She ought not to be forced to drink ice-water, as she must eat an extra quantity of food to warm it up to the temperature of her body.

What ails the cows? In November the test was lower than in October; then higher in December. The rations were the same and the same person had charge of them.

Mr. Cook.—I don't know. Have seen the same thing in our herds and among the herds of our patrons. I can't answer the question.

What is the best early summer feed to grow for milch cows?

Mr. Converse.—I incline to the belief that ensilage is the cheaper. Very many farmers are building siloes for summer feeding. If you do not have it, grow alfalfa or oats and peas. Alfalfa is, perhaps, best, for, when you get a good stand, it will last a number of years, while from two to four cuttings may be made in a season.

Can apples be fed to milch cows, successfully?

Mr. Van Alstyne.—Yes; but I would begin with not more than four quarts of mature apples per day; then increase the quantity to a peck. The quality of the apples will depend somewhat on the amount. They are of the most benefit when fed with coarse fodder, hay, cornstalks, straw or ensilage.

What is the best food for a milch cow in winter, and how much shall she be fed?

Mr. Cook.—It will all depend: First, what is the roughage, and what is the capacity of the cow. We should aim to feed that which will produce most at cheapest cost, and then, if we have a cow that will profitably respond, we should feed her all she will digest and assimilate. One cow will require more, another, less, and one cow will respond better to one ration than will another. The question implies an experiment together with the cost of the foods.

Wanted: A balanced ration for milk that will test 3.5 per cent. fat, using corn stalks, corn meal and oats?

Mr. Cook.—That might do, but, I think I would leave out the corn meal. Of course, it would depend very much on the quality of the corn stalks.

How about selling oats and buying wheat bran?

Mr. Cook.—I don't believe I would do it. We have had this thing somewhat overdone. I mean this advice of selling oats and buying bran. But it would all depend on the price of the oats and the quality of the bran.

Should a heifer persistent in milk be dried off before her second calf, having milked only 10 months?

A Farmer.—No; keep right on milking her.

Mr. Converse.—I do not believe a man ought to feed a cow with the intention of drying her off, nor should the grain ration be taken off for that purpose. But I would feed less grain and less roughage.

In dairying with four or five cows, which breed is the best to keep for butter and to raise stock for beef to be ready for market at two years of age? Would you keep Thoroughbreds or crosses, and what breed or what cross?

Mr. Converse.—I would not combine the two, nor would I cross two breeds. If I wanted milk, not butter, I would select the Holstein. If butter, I would invest in the Jersey or Guernsey, both give milk rich in butter fat. But, do not invest in a general purpose cow; either go after beef or butter. If the latter, select a dairy breed.

For a family cow in a village, what breed or grade do you prefer?

A lady.—A Jersey cow is the one to invest in.

Mr. Cook.—I incline to the belief that the lady is right. If one wants a reasonable quantity of good, rich milk, the Jersey, I think, will fill the bill.

A voice.—How about the Ayrshire?

Mr. Cook.—As a rule, the Ayrshire gives a good flow of milk, in quality between the Holstein and Jersey. The average butter fat per cent. in such milk is not far from 3.5 to 4. But there are Jerseys and Jerseys. Some of them are very poor sticks, while there are some Ayrshires that are fine individuals and rich milkers.

Would a cow that was poor in flesh give poor milk?

Mr. Cook.—I am not going to say she would or would not; but if a cow is in her normal condition she will give normal milk. I have seen cows giving a large quantity of milk that was very rich in fat, yet they were poor in flesh. I saw one at the Geneva station that was giving 32 pounds of milk per day, rich in fat, but you would not want her in your herd.

At what age should heifers come in milk?

Mr. Eastman.—From 18 to 24 months, but there may be a difference in breeds; if, however, I could have it as I wanted I would have the time from 20 to 22 months; at that age she will do well and nearly fully develop by the time she is three years old. We want to develop the cow from the start, beginning early. We have one heifer that we milked 106 days before she was two years old, and she gave 20½ pounds the last day.

What would you sow for pasture grass where you plow up your pasture to kill out weeds, to have something fresh for your cows the same season, if you sowed it in the spring?

Mr. Cook.—I don't hardly know. Orchard grass is good when kept closely fed. Meadow fescues and the white clovers are also good. Orchard grass, if allowed to grow too large, becomes hard and woody. We have it eight years in one pasture, but it is kept eaten down close. If I were to plow up my pasture to kill out weeds I would sow rye to feed early.

I would ask Mr. Converse if some breeds of cows will not hold out in their milk better than will other breeds?

Mr. Converse.—No, sir; it is not a case of breed, but of individuality. Some cows of a breed will hold out longer than will others, whether they be Guernseys, Ayrshires, Jerseys or Holsteins.

How does the cow secrete her milk, or give up or withhold butter fat?

Mr. Cook.—I don't know. The darkest place in the world, said Governor Hoard, is the inside of a cow. The nervous cow gives most butter fat and will withhold it more than will any other type.

Taking a good healthy herd of cows, feeding them good corn ensilage, 30 to 35 pounds each, daily, with two full feeds of clover and timothy, with a good grain ration of bran, oats and corn, say seven pounds of the mixture and three pounds of cottonseed meal, ought such a ration produce a good quantity of milk? What changes would you suggest, if any, to better the quality and quantity of milk?

Mr. Cook.—I should think that would be a very good ration indeed, but one ought to watch the cows and feed accordingly. The weak point in that formula is its cottonseed meal, the per cent. being pretty high.

Will it be profitable to feed ensilage in summer?

Mr. Ward.—Most assuredly. The time is close at hand when every man who keeps live-stock will have a summer silo. It is coming and will come to stay. I have seen ensilage three years old that was perfectly sweet and as good as new.

Does a mixture of peas, oats and barley make a balanced ration for cows giving milk in summer?

Mr. Converse.—I would leave out the barley.

Mr. Cook.—That would make a good ration, and I am of the opinion that it is not a good plan to begin balancing a ration in summer for the old cow till she has all she wants to eat.

A Farmer.—Would you feed a cow grain in summer

Mr. Cook.—It would depend on the value of the milk; but our practice at home is to feed some grain every day. We buy cheaply as we can, and get all we can for what we sell.

Which is the best time to feed grain to milch cows, before or after feeding fodder?

Mr. Gould.—It does not make much difference, but I prefer to feed it before; do not feed it while she is eating roughage; if you have not fed it before, wait till after you are through milking.

Does 60 or 70 pounds of ensilage, one of pea meal, three of bean meal and four of mixed feed, make a good ration?

Mr. Gould.—To guess, I would say there was enough protein in such a formula to balance the ration.

Does it pay to weigh and test milk?

Mr. Ward.—I believe that a man ought to weigh and test each cow's milk, so as to be able to weed out all the poor ones.

Mr. Jerry Clarke.—I had 11 cows which made me $100 worth of butter each, in a year. I also sold a pair of oxen for $300. They were Holsteins, too. One man here says that there is no such thing as a general purpose cow, but I know better. Mine not only brought me good results in butter, but calves also.

What effect will buckwheat bran have on a cow in calf?

Mr. Cook.—I would feed buckwheat middlings in place of the bran, but I would not feed them exclusively. It is better to add some wheat bran or gluten. Then too, the nature of the course fodder must be considered; the best of which, for such a cow, is corn ensilage if we are to feed these grains. We want to balance the ration, and, a cow in calf, must be fed so as to perfect the calf as well as to keep the mother in good condition; so, then, there must be protein to furnish blood and growth for the unborn calf, as well as for the mother.

What is the proper ration to be fed with timothy hay for butter?

Mr. Cook.—Timothy hay is a carbonaceous food and will not produce much milk, if fed alone. To get best results from it, one should feed the protein foods such has have been recommended here, viz., wheat bran, buckwheat middlings, gluten, linseed meal and oats and peas, always taking into consideration the individuality of the cow, then feeding accordingly.

What variety of grain is best to feed for milk and butter, for best results?

Mr. Litchard.—It would depend on the quality of the hay. Clover hay is much more valuable for feeding a cow than is mixed hay or timothy. Corn stalks left out till this season, have a ratio of 1 to 17. Bran and linseed meal would be the most profitable to feed with ensilage or hay. Eight to ten pounds of bran, three of linseed meal and 30 to 40 pounds of ensilage will make as good ration for an ordinary cow, as we can formulate. With clover, less bran and linseed may be fed.

Is rape a good food for milch cows?

Mr. Van Alstyne.—There is no question about the value of rape. It is, however, a sheep food; but it may be fed in a limited quantity to cows. If you want it for spring feed, sow it early in the spring. If for fall feeding, sow it in August, but it may be sown in the corn during the last cultivation for fall feeding. Dwarf Essex is a good variety.

What would be the result if rape were sown later than the last of April or first of May? Would such seeding last until fall?

Mr. Ward.—No; I would not sow it then for fall feeding. Forty-five days are time enough. From the 10th to the 20th day of June is early enough. It will then be ready to cut in August, while the little red louse, that attacks early-sown rape, will not appear. Sow the Dwarf Essex variety.

Is this a good ration for milch cows, viz.: 10 pounds of ensilage, 10 pounds of timothy hay, seven pounds of gluten meal, one pound of peas and oats?

Mr. Van Wagenen.—That is almost an ideal ration. It is a little wider than the German standard but is very nearly like the one the professor put on the blackboard, having a ratio of 1 to 5.9

When the farmer is depending on the factory, that runs but eight months of a year, and he only wants his cows to go dry two months, which two months are best for his cows to go dry?

Mr. Ward.—I would turn that question around and run the factory twelve months, if I could get a man to do it.

Mr. Converse.—The man will do it, if he can get the milk. We ought to produce more milk in winter than in summer; while the same cow will give 1,000 pounds more milk during the year when she drops her calf in the fall, than in the spring, if she is well cared for and properly fed.

To Mr. Van Dreser.—How would you test the individuality of a cow?

Answer.—First, have her well, then feed her well. Feed a cow all she will eat, digest and assimilate, first finding if the cow will pay a profit on what she eats and the care she receives. You will ascertain her worth by the use of the scales and the Babcock test.

What is the matter with this ration: 15 pounds of timothy hay, five pounds of clover hay, four pounds of gluten feed, 15 pounds of roots and four pounds of bran?

Mr. Cook.—I see nothing the matter with it; it is, in fact, almost an ideal one, having a ratio of 1 to 5.4.

Shall we grind grain for cows finely or have it coarse?

Dr. Smead.—As a rule, fine, but, in oats, it is not necessary to grind the oat hull finely. If it is only crushed it will do, but the finer the inside or kernel is ground, the better. If you are going to feed ground oats to pigs, sift out the hulls, and the finer corn is ground, the better. Some animals, as a rule, do not masticate grains properly.

What is the best grain ration, with corn ensilage and hay, for the production of milk?

Mr. Cook.—Wheat bran or wheat middlings are as good if not better, all things considered, than any other foods. Gluten is a good food, but it does not contain enough mineral element. We are too apt to look for protein only; but the cow must have mineral matter. Gluten does not furnish it and I should not want to feed a cow enough cotton seed meal to give her the requisite quantity of mineral matter. If I remember correctly, there is four times the quantity of mineral matter in wheat bran as in gluten. But a mixture of wheat bran and gluten, half and half, with good corn ensilage, would make an excellent ration.

How about barley sprouts?

Mr. Cook.—Malt sprouts and wheat bran, according to the tables, contain the same per cent. of protein, making the figures

100 each, while H. O. dairy feed is figured at 103, gluten feeds 120, gluten meals 152, old process linseed meal 135, cotton seed meal 152, Buffalo gluten 125. These figures are on the basis of wheat bran at 85 cents per hundred pounds for the protein value. The starch foods on a basis of corn meal at say $1 per hundred are valued as follows: Corn meal $1, "Quaker Oat" feed 85 cents, oat hulls 75 cents, "H. O." horse feed 95 cents. I think we lose sight of one great point, that is, we are feeding the cow for the special purpose of getting milk and overlooking the most important ones of her health and that of her posterity.

Will Mr. Gould tell us what breed of dairy cows would be the best for a general-purpose cow, in his opinion?

Answer.—Why not ask what machine will do all the work on the farm. We cannot have a cow that will give a lot of milk one day, a heifer calf one year and a bull the next, and, lastly, beef, and have her a success. The farmer must use the best he has; then breed up. One man wants a Jersey, another a Guernsey and so on. Take the best you have got. Breed up and stick to them.

Will young cows do as well when standing beside old cows through the winter as they would if in separate stables?

Mr. Cook.—I do not know why they will not. We have both old and young cows standing side by side, and have had every year, but I never have detected any difference between them and those which were standing alone.

How long should a cow go dry?

Dr. Smead.—Just as long as she wants to. Don't strive to dry her off. Nature made her as she is. If she wants to give milk till she drops her calf, let her do it. I have a cow that has been milked every day during seventeen years, and her oldest daughter is owned by my hired man. That old cow has never been milked without eating a grain ration. The daughter is as persistent a milker as is her mother. The old cow gave 6,800 pounds of milk last year, testing from 4.8 to 5.2 per cent. of fat; and there has been no falling off in her milk flow during the last ten years. The old cow is a cross between the Jersey and Ayrshire.

Do you think it advisable to milk a cow right along like that?

Answer.—No. If I could have my way about it I would have her go dry about one month; but if you ask me why, I shall say "I don't know." But one thing is sure, the cow that milks right along and drops her calf every year, will not have milk fever. It is the big milker that goes dry awhile and is fed large rations of concentrated foods, which make a surplus of blood, or the one that runs in rich June pasture when she freshens, that has milk fever.

Two weeks before the calf is dropped, give the cow three-quarters of a pound of Epsom salts and a teaspoonful of powdered gentian. Repeat the dose every five days till after the calf is born. This medicine thins the blood and stimulates the liver so that it will not become torpid. This treatment is followed by my neighbors and have heard of but one case of milk fever in the neighborhood in eight years.

Mr. Converse.—I should never feed a cow to dry her up. If a cow has been bred to give milk the year round, it will be hard to dry her off. If, however, she has been bred and fed to go dry four months it will be hard to prevent it. But I should not fuss with a cow that wants to go dry four months; let some other fellow fuss with her; milk her right along, if she persists in giving milk.

Is it any particular sign that the digestive apparatus of a cow cannot find any particular element in a food because a chemist cannot do it?

Mr. Cook.—I don't know. But a cow will find in some foods that which the chemist does not. As a rule, however, the cow and the chemist agree. But the two differ in succulent foods. The chemist finds water; and the cow finds it, but gets a benefit from it that she could not from separated water. This difference the chemist cannot find. But, when the chemist and the cow are consulted as to the analyses of dry foods, such as gluten, bran or corn meal, they fully agree. June grass has a feeding value, which, if the grass were cut and dried into hay it would not have. The difference is caused by the water or juice in the grass being partly dried out. When this moisture has been dried out, the grass loses in feeding value, nor can it be restored by wetting it with water. We all know that a cow will give a larger flow of milk on June grass than on any other food.

What would the offspring be, if a cow milked steadily?

Mr. Converse.—If I could control conditions I should milk a cow eleven months, but I cannot always do it, so if a cow is so persistent as to milk right along I let her do it. It is dangerous to dry off such a cow. The tendency would be that a calf from such a cow would be a persistent milker.

Mr. Cook.—I would not dry off such a cow; but I will say that our best cows are those which milk about ten months.

Does it pay to wet meal to be fed to cattle with water?

Mr. Cook.—I have made many experiments in feeding wet and dried grains, and am convinced that it does not pay to wet them.

A Farmer.—I wet the grain ration for my cows and am satisfied that it pays, for the reason that the cow does not waste so much by scattering it while eating.

Mr. Cook.—The cow will not eat a dry ration so ravenously as she will a wet one, besides, she will wet it sufficiently with saliva.

Which is the most profitable way a farmer can use his oat straw on a dairy farm?

Mr. Ward.—As Mr. Converse has said, oats cut at the stage when they have half turned to a yellow color, then cured and threshed, will contain a large feeding value when fed to stock; but, if left till they are fully ripe, the best use that can be applied to the straw is to use it for bedding in the stable.

Will it injure a cow to milk her all the year around?

Mr. Pingrey.—I prefer to have a cow go dry at least six weeks; except, perhaps, a heifer. I should milk a heifer as long as I could get a tea-cupful of milk from her. I have cows, however, that I can milk the year round, but I do not care to do it.

Mr. Ward.—What would you do in this case—I have a cow due to come fresh in less than three weeks that is giving two large milk-pans full of milk every day.

Mr. Pingrey.—Milk her.

Mr. Ward.—That is just what we are doing and shall keep doing.

Mr. Pingrey.—Some cows at such a stage of gestation give gargety milk. Should they be milked?

Mr. Converse.—Yes; if you stop, the cow will lose a portion or the whole of the udder.

A Farmer.—Would you stop milking a cow when she begins to "spring bag?"

Mr. Converse.—It would depend upon the quantity of milk she was giving. If the mess was large, I would not.

What is the comparative value of hominy meal and gluten feed for milch cows?

Mr. Van Alstyne.—I have not the tables with me, but I think that hominy is worth about $2 less per ton than is corn meal, while gluten is wholly a different food. One is carbonaceous, the other nitrogenious, so do not compare at all.

How much cotton seed meal would you feed, if any?

Mr. Cook.—Not to exceed two pounds; and I would feed it dry with the dry coarse fodders.

Do cows need a grain ration when in pastures? If so, what is best to feed?

Mr. Smith.—If there was all the pasture the cows required, probably they would not need any grain ration; but, as a rule, in the average pasture in dry weather the cows do not get enough to eat unless they wander about all day. When a cow does this she is not making milk, and must necessarily shrink her milk flow. The most successful dairymen I know to-day in this State feed grain every day in the year.

What grains would you feed?

Answer.—Wheat bran and cotton-seed meal; but I would not begin with more than half a pound of cotton-seed meal and would not feed more than a pound of it per day. It is a concentrated food and must be fed judiciously.

Dr. Smead.—Oats and peas would come in very well for such feeding. Buckwheat middlings are a good food, but they make a poor quality of butter. Besides, their manurial value is not very great; much less than in some of the other protein foods. The manurial value in buckwheat middlings is mostly in the nitrogen, the whole being $5.16 per ton.

Are roots equal to grain for producing milk and butter?

Mr. Litchard.—That is a hard question to answer. Both are necessary. The value of roots is found in their succulence, and if one does not have ensilage, he should provide roots for the cows. Their value is more in the aid they give to digesting other foods than in the food itself.

How often would you advise the salting of cows?

Mr. Cook.—Keep salt where the cow can have free access to it. She will not eat it except when she craves it, nor take any more at a time than she wants.

How much grain should a heifer one year old be fed with hay and ensilage?

Mr. Cook.—It would depend on the heifer. As well ask how many buckwheat cakes a man ought to eat in the morning. Possibly a pound of bran and oats, or some buckwheat middlings might be added.

How can the best ration be made at this time of year for milch cows (February 1st)?

Mr. Converse.—Special relation should be made with the coarse foods. Feed ensilage at night and morning—about 20 pounds each; feed at noon some clover hay. The grain may be bran, oats and peas or gluten meal, to furnish protein. If you do not have any ensilage or clover, but timothy or mixed hay instead, a little corn meal may be added to furnish starch and sugar.

What is the difference between a gluten feed and gluten meal?

Dr. Van Slyke.—I think the per cent. of protein in gluten meal is between 35 and 40. That in the feed, somewhat less. A bulletin issued by the station will give the figures. You may get the bulletin by asking for it. If you do not get it, it will not be our fault.

Mr. Dawley.—Cornell has also issued a bulletin—No. 154—giving all the analyses of these foods, as well as others.

How often should cows be fed during the day?

Mr. Cook.—Well, I am inclined to think that twice a day for both ground and coarse food is enough. Such a practice has given just as good results with us as has feeding three times, but we must feed uniformly; not twice to-day, three times to-morrow, and four times the next day.

Does it pay to grind the corn-cob to feed?

Dr. Smead.—No; but it will pay to grind the corn and cob together, the cob being ground finely. Best results will come from mixing it with wheat bran, there being a little fibre in the bran, which the animal seems to require. I use an iron sweep power mill, and grind my corn and cob together, doing it finely.

At what age should a heifer begin to breed?

Mr. Cook.—I don't know; but if I should tell you that 50 of our best cows now in milk, dropped their first calf at three years, you might consider me as heterodox. Yet such is the case; but the cows are magnificent Holsteins. One will have to study the animal and breed. If the cow comes from a breed or family that were bred to drop their first calf early, I would allow her to do it. As a rule, however, I prefer to have the young heifer become matured before she becomes a mother.

Does it pay to feed cows grain this time of year (November 25th)? If so, how much?

Mr. Henry Stevens.—It would depend somewhat on the condition of the cow, whether she gave a little or a good mess of milk. I think, however, at the present prices of butter and cheese that it will pay.

Mr. Farrington.—My father always said, "Feed the cows grain in the fall of the year."

Mr. Cook.—I don't like this idea of talking about feeding a cow, now. We want to feed a little grain all the time. If we do not feed till now, the chances are the cow will put it all on her back. I have known instances where a ton of bran was fed and not a cent of it was gotten back. We feed some grain all the time.

What is the value of the proprietary cattle foods compared with gluten?

Mr. Cook.—"Sixteen to one." Gluten is sixteen; the other not more than one. The basis of all these prepared foods is linseed meal, costing about $30 per ton. There is a little tonic and salt, which cost but little, while the preparations are sold for about $300 per ton to the man who is fool enough to buy them.

Dr. Smead.—Mr. Cook's remarks apply fully as well to the condition powders sold. They have a basis of linseed meal with powdered gentian, saltpetre, ginger, charcoal and anise seed. The cost of 100 pounds of the above mixture will be about $2.85, but the man who comes along to "bless you," sells it for about 15 cents a pound, or $10 profit on 100 pounds of oil meal.

Are we taught that a cow giving six quarts of five per cent. milk would make no more butter if she gave 12 quarts of milk?

Mr. Smith.—You are not taught anything of the kind; but that a cow in normal condition giving 5 per cent. fat cannot be made to increase it; but as a cow increases in lactation she shrinks her milk flow, so there would seem to be more fat in the milk. In fact, there will be, but the water has been decreased, so that there is not such a volume of it.

Will bran produce as good quality of milk as will corn meal? Will good strong heavy foods produce better milk than light ones?

Mr. Cook.—Doubtless, the question refers to feeding butter fat into milk. How many of you think it can be done?

Four men voted.

How many think it cannot be done?

Twenty hands went up.

Mr. Cook.—Some of you voted twice, but the majority are right. It cannot be done permanently. I have, however, changed the per cent. of fat in milk by changing a ration, when the cow had not been kept up to her normal condition. Perhaps a change of rations might decrease the per cent. of fat. As a rule, the longer a cow is in lactation, the richer will be her milk, but the flow will be proportionately less. It is a decrease of water, not an increase of fat. If corn meal is fed to excess, the chances are that there will be a decrease of fat in the milk and an increase of animal fat, for the reason that corn meal contains but very little of the milk-making element. It is highly carbonaceous, and does not contain protein enough. We must feed the cow that which will make blood. Corn meal will not do it. When you kill a hog that has been fattened on corn only, how much blood do you get when he is bled?

A Farmer.—Not much.

Mr. Cook.—The same is true when a cow is fed wholly on timothy, corn, corn meal, cornstalks or straw. If the latter-named coarse foods are fed, take out all the corn meal and substitute bran.

Will skim-milk, fed back to a cow, produce good milk? Do you recommend such a course?

Mr. Cook.—How many of you feed the skim-milk back to your cows?

A Farmer.—I used to feed it to pigs, but have been feeding it back to the cows a year or more, and am convinced it was better to give the pigs away and feed the milk back to the cows.

Mr. Litchard.—Mr. Menzo Wilcox of Otsego county, one of the best dairymen in central New York, feeds all his skim-milk back to his cows, and reports it worth 20 cents per hundred pounds for that purpose.

How shall we best keep uniformity in a herd's milk through the year?

Mr. Cook.—We must first have a herd of persistent milkers and there must be some cows coming fresh every month. With such a herd, properly cared for and fed, there ought not to be a variation of more than two-tenths of one per cent. of fat; I know of no other way to do it.

Which is most profitable, at the same price, to buy, bran from winter or spring wheat?

Mr. Van Alstyne.—I do not think there is so much difference between winter wheat and spring wheat bran, as there is in samples of each. Some bran is poor stuff, and very much of the middlings which we get is nothing more than bran reground. As a rule, however, the brans are not very badly adulterated. The new feed law does not include them. But don't buy any of the oat foods, cotton-seed meal, linseed meal, pea meal, starch feeds, malt sprouts and many others of similar natures, unless a guaranteed analysis is furnished by the miller or dealer. If you ask for them he must put the tags on the sacks, on which is printed such guaranteed analysis.

What is the best tie stanchion or stall for the cows?

Mr. Cook.—There are a good many best stanchions. Much has been said against the old rigid stanchion, and yet it has its advantages. We have come down to a swing stanchion, which we make ourselves, and will put into our new barn.

A drawing of it was shown and explained. Mr. Cook said the stanchion would be made of elm, and, as made at home, would cost, all told, about 60 cents each, in bunches of 25 or 30 sets. This does not include the work of putting it in place.

Mr. Smallwood.—We buy such stanchions here, in place, for about $1 each. I have discarded the Bidwell stall, having made up my mind that I could better afford to lose a teat or two from a cow by the one standing next to her, than to keep a man about to keep the stalls in repair.

Which is the best way to bring cows from the pasture at night, a dog or with a handful of meal?

Mr. Converse.—I would not bring the cows to the stable with corn meal, but wheat bran instead.

How much grain should be fed a cow fresh in milk, for profit? How much corn and shorts, at $20 per ton, will it be profitable to feed a cow that has of hay all she will eat, with butter at 20 cents per pound and how much of each?

Mr. Van Alstyne.—I will answer these two questions in one. But I will first say that the two foods—hay and meal—will not make milk, while the shorts will. It would depend first on the cow; next, on the coarse fodder. I should first want to see the cow. She may be one that it wouldn't pay to feed a pound of grain to, because she would not respond in the pail. When you have a cow that will, feed her all she will eat, digest and assimilate. If you are feeding timothy hay, cornstalks, ensilage, straw or other fat-forming foods, she will not require so much corn meal. If the hay is clover and you do not have well-eared ensilage, she will require more meal. As a rule, from six to twelve pounds of mixed grains will be enough for any ordinary-sized cow, say, weighing 1,000 pounds. There is another point to be considered, which is the price of grains, also the price of the cow's product. We should keep an account of the prices of foods and products, and aim so to feed as to obtain the desired production, at the same time derive a profit at the market price of butter, cheese or milk. With my dairy, if they give me 300 pounds of butter per cow, at present prices for cow foods, I can clear a profit from butter at 18 cents per pound.

Which has the most feeding value, oat or buckwheat straw?

Mr. Cook.—I think the oat straw is a little more valuable, but there is a great deal of feeding value in buckwheat straw when it has been well cared for. As a rule, buckwheat is put up in too small shocks. It were better to set two or three of them together and then put the straw under cover.

What is the nutritive ratio of bran, compared with oats?

Mr. Litchard.—Bran has a nutritive ratio of 1 to 4. Oats 1 to 7 or 8.

Rations for cows in milk, two feeds of hay per day—How many pounds of cotton seed should be fed to balance the ration?

Mr. Cook.—I would not feed the cotton seed. Would much prefer gluten. It has a large per cent. of protein in it and is not so concentrated as is cotton seed. Wheat bran and buckwheat middlings should be mixed with the gluten, to furnish mineral matter which the gluten does not contain. But gluten meal, in comparison with other protein foods, cost a little too much. When When buying these foods, always take into consideration the protein value. I would not feed cotton seed no matter how cheaply I could buy it. I would much prefer linseed meal to it.

Dr. Smead.—Put in a word for oats and peas.

A Farmer.—How much shall we feed of them?

Mr. Cook.—I don't know. It will depend on the cow. No two would require the same quantity. Experiment with the individual cow, and feed so as to have her respond. Palatability of the food should also be considered.

Which is the best grain ration for a cow that is a good milker, equal parts of oats and wheat bran (by measure) or corn, oats and bran, with mixed hay, corn stalks and bean pods for roughage?

Mr. Cook.—Wheat bran and oats. Wheat middlings are a good food, but I prefer the bran. The cow needs mineral matter, which the bran will furnish. There is a little less digestible protein in the bran than in the middlings; still, all things considered, I prefer the bran. There would not be much difference in the analysis of the two rations, however.

To Mr. Converse.—What do you think of the Ayrshire cattle for this country?

Answer.—I do not care to say much about the Ayrshire, because I am interested in them. But I will say that, if one wants a hustler and has rough, hilly pastures, where a cow must work to get her living, there is none better. They give a good flow of good milk, being about midway between the Holstein and Jersey. They are also strong, healthy and hardy.

What do you think of the old milking strain of Shorthorns?

Answer.—It was a great mistake when they were allowed to go out. It was a most excellent dairy breed. When the breeders abandoned milk for beef in the Shorthorns they practically ruined the breed for dairy purposes.

Are the Devon cattle a profitable breed for the average farmer?

Answer.—I found at several fairs last fall that some breeders were trying to make a dairy cow out of the Devon, but it is more essentially a beef breed. I take but very little stock in the Devon as a dairy cow.

What do you know about the Brown Swiss cattle?

Answer.—There is a herd of Brown Swiss near me. I have been watching them a number of years, and do not like them. They are too beefy, and are not fashioned after the dairy form in cows. They have short, thick necks, large legs and feet, and are devoid of some of the most prominent features always seen in a purely bred dairy cow.

Are there two separate breeds of Shorthorn cattle?

Mr. Van Dreser.—The first importations of Shorthorns were of the milking strain. Another was made of the beef type, and the breeders sought beef more than they did milk, so that the dairy Shorthorn has been about driven out.

Mr. W. S. Moore.—There is also a type of polled Shorthorns, but they are beefy.

Mr. Van Dreser.—I would not select any type of Shorthorns now for a dairy herd; but they will be found one of the best beef breeds.

What is the best breed of cow to be got, and where can it be obtained?

Mr. Cook.—That would depend. If I were going to furnish milk to this milk station down here when they get it built, and they paid alike for all grades of milk, I would get a cow that would give a washtub full if I could find her. If, however, I wanted it for butter I would select the Jersey or Guernsey, and I believe the modern American Jersey the best; I mean the large, strong Jersey, one that weighs 1,000 to 1,200 pounds; especially for butter-making, is the best. We have a large herd of Holsteins, which give good flows of milk, ranging from 3.2 to 3.6 per cent fat, and I have also been investing in some Jerseys, with the view of ascertaining, if I can, which breed will make a pound of butter fat the most cheaply. If your creamery here takes milk by the Babcock test, and your milk tests much above 4 per cent., stick to it. If below 4 per cent., say 3.6, sell it to the station. As a rule, however, the price of milk at the station is just on a par with that at the creameries and cheese factories. The stations never put up the price for milk till the price of cheese and butter goes up, and they always drop the price as soon as those of butter and cheese drop.

Will it pay to sow rape in corn for fall feed for cows?

Mr. Van Alstyne.—Yes, sir; but I would not sow it for fall feed for cows that give milk, because the milk would be condemned. But for cows not in milk, or for sheep, it is a good food. Sow it in August or in September. It will remain green a long time after the frost comes. Sow it in corn, not with oats.

Are vetches valuable as a green food for cows?

Mr. Van Alstyne.—It makes a clover crop sown late in the fall, but the seed costs so much it makes it expensive. Sand vetch is said to be the best.

I have 10 fresh cows in milk, giving 300 pounds per day. Grain rations of gluten bran or buckwheat middlings, costing 12 cents per cow, all they can be made to eat. Can the ration be improved?

Mr. Cook.—I don't know whether it could or not, with the present food at hand; but with some succulents—ensilage or roots—I think it could. It would also depend on the time the cows had been in milk and their condition and the freshness of the hay. I think, however, that the ration as given would be pretty narrow.

The Questioner.—The ration costs about twelve cents per day.

Mr. Cook.—The cow will have to keep herself warm by burning up some of the protein in her food. I would feed a little more starch. It is just as expensive to feed a too narrow ration as one too wide; would add corn meal, which would not add to the cost; it should be cheaper.

What proportion ought corn meal and bran to be fed to milch cows to give best results?

Mr. Cook.—It would depend on the cows and the coarse fodder. As a rule, however, with clover hay, half-and-half by weight will be about right; yet some cows would require more of the bran or meal than others. With clover hay more corn meal may be fed than if the hay were timothy or mixed.

What should be the proportion of corn meal, bran and cotton seed meal, with hay, for a cow weighing 1,000 pounds?

Mr. Cook.—I would not feed more than two pounds of cotton seed meal to a cow per day. It is too constipating in its nature. I should feed oil meal in its stead.

At what season should a cow freshen to give the most milk during a year?

Mr. Eastman.—In September or October.

Mr. Gould.—My experience is that the same cow, coming fresh in milk in the fall, is good for 1,000 to 1,500 pounds more milk than when she freshens in the spring.

Mr. Eastman.—There would be a slight loss at first when the change was made, so I would have the heifer freshen the first time in the fall.

To Mr. Van Dreser.—What is the record of Pauline Paul's heifers?

Answer.—I cannot answer the question fully. I think, however, that Mr. Reed of Binghamton, has one of her daughters which has made 30 pounds of butter in seven days. There are others, which I have heard, are good producers. So far as I have heard, Pauline Paul's sons are more prominent than are her daughters.

What kind of stall or fastening is best adapted for the ease and comfort of the cow?

Mr. Van Wagenen.—We use the swing stanchion. There are several others and there may be among them some that are better. I would not use the old, rigid stanchion, and I believe that any one of the ties is better than the swing stanchion, because they permit a cow to turn and lick herself, something she cannot do either in the old rigid or the swing stanchion. Mr. Dawley uses a chain and long staple. It is the best I ever saw.

When shall we feed turnips or cabbage to milch cows, before, after or during the milking process?

Mr. Cook.—After milking, and do not feed too much at first. Begin with a small mess, which may be increased gradually. I once saw butter in Cortland that was made from milk from cows which had eaten large rations of cabbage every day. But such foods should be fed after milking time, should be balanced with nitrogenous foods, and one should always thoroughly cool and aërate the milk as soon as it is drawn from the cow. If they are fed during the process of milking a taint will surely get into the milk, so strong as to affect the flavor of the butter.

A Farmer.—What if a man has but little hay, but plenty of oat straw? What, then, should he feed?

Mr. Cook.—I should feed wheat bran and a little cotton seed meal. It makes a good ration. Good oat straw is about as valuable for feeding as is the average timothy hay. We are going to feed it this winter, but our oats were not left until thoroughly ripe before cutting them. Pea straw is also good; so is buckwheat straw for feeding, when fed with proper grains. Good timothy hay averages a nutritive ratio of 1 to 15; oat straw, 1 to 25; but I take the ground that early-cut oat straw is fully as good as late-cut timothy. But we are apt to classify all meadow hay, except clover, as timothy, when, perhaps, a large part of it is mixed grasses. I found, while in Delaware county, that the farmers were invariably feeding their cows some corn meal, although their meadows were classed as timothy. But I found that they were mixed grasses, which were cut early; therefore they did not contain enough carbohydrates, which was the cause for feeding the corn meal. Such meadow grass will have a ratio not wider than 1 to 12 or 1 to 14.

Are the Guernseys as large milkers as are the Ayrshires?

Mr. Converse.—No; they give, as a rule, milk containing more fat than do the Ayrshires, but not so much of it during a year. The Holstein and Ayrshire breeders have been and are now looking for a less flow of milk with more fat in it; while the Jersey and

Guernsey breeders are looking for more milk. As a rule, the cow that gives very rich milk gives a small flow, although she may remain in milk a long time; while the cow giving a large flow puts less fat into it. It is the tendency of these two extremes to come closer together.

Can a Holstein cow that gives 9,000 pounds of milk per year be made to give five per cent. milk?

Mr. Smith.—I don't know. I guess it would be pretty hard work. But there are some very valuable Holstein cows, those which give 4 per cent. milk. The average Jersey cows do not give more than 4.5 to 4.8 per cent., although there are many which give a much higher per cent. As a rule, the cow which gives a large flow of milk does not put in so large a per cent. of fat.

How does Pasteur's stock food compare with other stock foods?

Mr. Smith.—I don't know anything about that particular variety, but I suppose it belongs to the general line of these foods. They are composed of linseed oil, meal and salt, with something to make them smell well, and a little tonic. They cost from $25 to $30 per ton, and are sold to the farmer in small lots at $300—a good business for the manufacturers, but a poor one for the farmer who buys them.

What is the value of sugar-beet pulp to feed cows?

Mr. Cook.—They are experimenting with sugar-beet pulp in feeding a bunch of steers at Cornell, but no results have been published as yet. Prof. Wing says that they are quite well satisfied so far, as compared with ensilage, but it is not yet safe to quote a price for it.

What does gluten feed cost at the experiment stations?

Mr. Cook.—I do not know just now what gluten feed is quoted at in the market in car lots.

Mr. Van Wagenen.—At Cobleskill, last week it was $18.50 per ton.

Mr. Cook.—The new cattle food law which Mr. Witter got through the legislature last winter will go into effect the 1st of January, when all prepared cattle foods will be sold on a guaranteed analysis. So, then, if you buy gluten, mixed, or other prepared cattle foods after that date, insist on a guarantee. If the dealer refuses to give you one, and sells his goods, he may be prosecuted and fined.

Which has the most feeding value, barley straw or oat straw?

Mr. Cook.—There would not be much difference, provided both were cut at the same stage of ripeness. As a rule, our grains are left till too ripe before cutting them; then we lose more or less of the feeding value in the straw.

Will the feeding of such food as turnips or cabbage during milking time, taint the milk?

Mr. Litchard.—I guess there is no doubt that such foods as turnips and cabbage, if fed during the process of milking, will taint the milk.

Mr. Cook.—The trouble, as a rule, lies in feeding too much. Instead of feeding a few quarts at first, a half bushel or more is fed. If, however, one begins with a small quantity and increases it slowly, a much larger quantity may safely be fed. Prof. Wing determined this fact, through a number of experiments. But I would not feed impure foods of any kind, such as rotten potatoes, turnips, cabbage or apples, to any cow.

Do you consider it at all advisable to allow a Jersey or any other breed, to come in before she is two years old?

Mr. Van Dreser.—It would all depend on constitutional vigor. As a rule, I would not prefer to have a heifer drop her calf before she was two years old. But there might be one of some breed that was strong enough to withstand the strain on her system.

Is it a fact that an average Jersey cow will give more for the food consumed than will any other breed?

Mr. Van Dreser.—According to the Chicago test it required less feed for the Jerseys than of either of the other two breeds there, the Guernseys and Shorthorns. There is no one dairy breed above another, in every respect, and the man who is such a breed partisan as to think his breed better than all others, makes a serious mistake.

What breed of dairy cows would you recommend for the farmers of Centerville and vicinity? Our cheese factories all close in November and do not open till April, generally.

Mr. Converse.—What breed of cows do you have here?

A Farmer.—Every breed and grade.

Mr. Converse.—The first step in the line of improvement should be by the selection of a full blooded sire. Select one from a dairy breed and select the breed that, with your feed, care and conditions, will produce a pound of butter fat for the least money; and, if it is a breed that came from Europe, give it as nearly as possible the care and food it had in its native home. If you select Jerseys, give them Island of Jersey care; if the Holstein, such care and foods as it receives in its Holland home. Never use a cross-bred or native sire; but, in selecting a sire, do not be governed by pedigree alone. There are thousands of them that do not amount to a snap. Don't bank on pedigree, but make performance the test. Pedigree is all right in a certain way, but it must be backed up by performance of ancestry at the pail. When you have such a sire, test with scales and Babcock each one in the herd. Select the best ones and begin breeding for a special purpose, which should be milk and butter. Do not undertake to run a dairy with dual-purpose cows. Beef and butter do not have a home in the same carcass. Either one or the other should be sought.

What is the best root to grow for milk production?

Mr. Hartley.—All in all, I find mangold's the best root to grow for that purpose.

Mr. Van Wagenen.—I think that Indian corn is the best "root" to grow.

Mr. Cook.—I do not grow roots, my back not being calculated for that business, but I believe it pays to grow and feed them, even if one has ensilage.

Will it pay the farmer to cut his hay and straw for feeding to his horses and cattle?

Mr. Van Wagenen.—Our system is to cut all the straw with the hay, feeding three times a day with the ensilage and grain all mixed. In so doing we are able to get rid of something that is not worth much to feed alone and is too good to waste for bedding our animals. We use steam power and a 16-inch cutter.

To Mr. Converse.—What is the difference between the Jersey, Holstein and Ayrshire breeds?

Answer.—The Jersey came from one of the channel islands and gives milk richer, as a rule, in butter fat, than does any other breed. The Holstein comes from Holland and gives milk containing the smallest per cent. of butter fat, of any one of the dairy breeds. The Ayrshire comes from Scotland and is a medium between the other two breeds.

Will it pay to feed the average cow $18 bran?

Mr. Powell.—I guess it would be an even race. The average cow brings an income of about thirty dollars per year. I find the average in several counties to be about that figure. Such a cow will not pay for much bran at eighteen dollars a ton.

With bran at $18 per ton, corn meal at $19 and hay at $11, which is the cheapest cow feed, and in what proportion should each be fed?

Mr. Cook.—I know of no way by which to compare corn meal and wheat bran. They are entirely different. If you have corn ensilage or timothy hay, it would be the height of folly to buy corn meal. If you have neither the ensilage nor timothy, but clover, then put in some corn meal. But I prefer good wheat middlings to the bran. It is not right, theoretically, but I have noticed that when I substituted them for the bran, the cows invariably gained in their milk flow.

How is milk secreted? Is it secreted in the udder. If not, where?

Dr. James Law.—Milk is secreted in the udder, the process being, as in other glands, a selection and transformation of the appropriate constituents of the blood by the microscopic cells which line the ultimate recesses or follicles in which the milk ducts originate. Each of the smallest milk ducts terminates in a cluster of slight dilatations or closed sacks lined by round cells which accomplish the work of selection from the blood and transformation of the materials which go to form the milk. Beneath this surface pavement of cells, is a delicate membrane, and beneath that the network of capillary vessels in which the blood circulates. In health, therefore, none of the blood can get into the milk ducts, except such as has been passed upon by the secreting cells and modified as may be necessary, to form the liquid known as milk. The constituents of milk are in the main, water, salts, albumen, casein, fat and sugar, and of these the water, salts and albumen are the only ones that exist ready formed in the blood. The elements that give to the milk its commercial value—the casein, the butter fat, and the sugar—are made up in the udder, by the functional activity of the gland cells.

Is the color of milk changed from red to white before it reaches the udder?

Dr. Law.—No; the milk as such does not exist before it reaches the udder. Healthy milk is never red, and it only becomes so by reason of some unnatural condition such as:

a. The escape of red blood globules or of blood coloring matter through the walls of the gland follicles or milk ducts. This may occur from wounds, bruises, conjection or inflammation of these parts, or from diseased conditions of the blood in which the coloring matter is set free.

b. The feeding upon red coloring matter such as madder, which escapes with the milk into the udder follicles and milk ducts.

c. The presence in the udder and milk ducts of a pigment-forming microbe, like the *micrococcus prodigiosa*, which produce a red color in its growths.

Is there a visible connection between the milk veins and the udder?

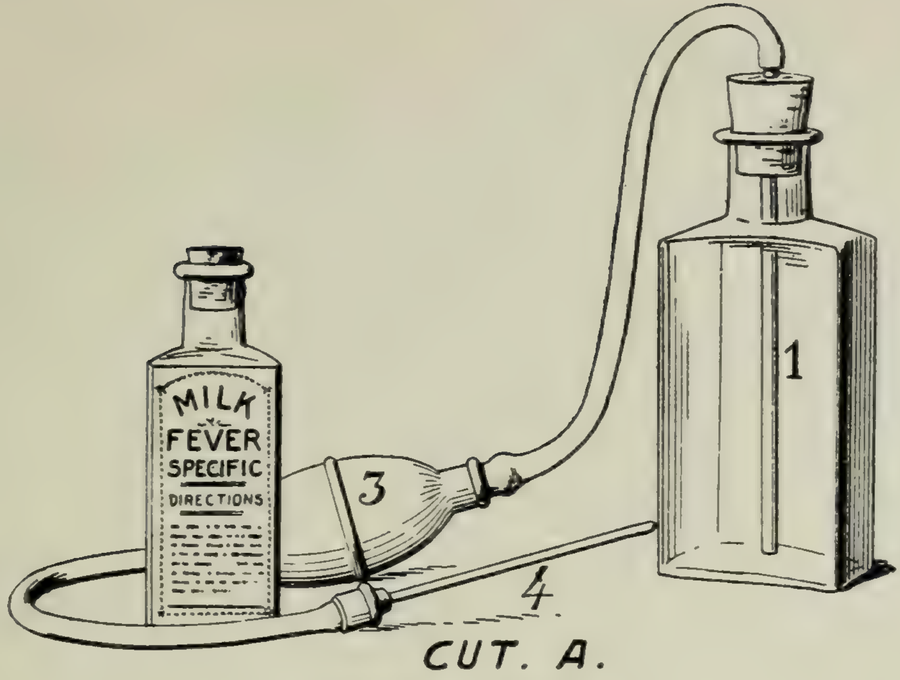
Dr. Law.—The term *milk veins*, usually applied to the superficial abdominal veins, has misled a good many people and led them to suppose that those vessels convey milk to the udder, and that therefore the larger the veins the greater will be the yield of milk. As we have already seen, the milk is not ready formed in the blood; it cannot be said, therefore, that these veins convey milk. These veins have, it is true, a visible connection with the two anterior quarters of the udder, from which they return blood toward the heart. But like the other veins of the udder (the external pudic, and obturator) these only carry blood back from the udder to the heart, they don't bring any blood to the udder. Their connection with the udder is that of vessels which carry back into the general circulation, the blood which has already, in the udder, given up various of its constituents to form milk, not that of vessels which carry to the udder the materials out of which milk has to be formed. Their size in heavy milkers indicates that a very large quantity of blood circulates through the udder, so that even its unused surplus requires such capacious vessels to carry it back into the general circulation. The great size of these veins further indicates that the whole circulatory system is constructed on a large and generous scale, and that there is a great store of blood, and behind that a great power of digestion and assimilation, conditions that are absolutely essential to a liberal yield of milk. In this way the size and even the duplication of the milk veins become valuable indications of the probable milking qualities, though they convey neither milk nor blood to the mammary gland.

What is the Schmidt treatment for milk fever? Is it a sure cure?

Mr. Dawley.—The Schmidt treatment has not been in use long enough to say that it is a *sure* cure. I have tried it in one case, with a home-made apparatus and saved the cow. The reports in relation to the results from the treatment are most encouraging, it is based on an entirely novel idea as to the primary seat of the disease. Heretofore the veterinarian's attention has been directed to the uterus (womb), as being the medium through which the poison was admitted to the circulation and carried to its secondary seat of operation (great nerve centres) where its death-dealing depression was exhibited, and although very vigorous efforts were pursued to combat its further introduction into the system, and counteract the evil effects produced, the results attained were at best most unsatisfactory and discouraging.

Without attempting to enter upon lengthy details regarding the malady, we may state that the result of the new Schmidt treatment coupled with close observation along experimental lines has demonstrated beyond all doubt that in the udder is the original seat of the disease. Decomposition of the secreting cells in that organ when the milk secretion begins, immediately after calving. A loucomaine (depressent poision), being formed from the cholesterin bodies and rapidly absorbed into the circulation is the direct cause of the disease. Why Prof. Von Kolding turned his attention to the udder we are not told, but since attention has been thus directed, various interesting and highly instructive experiments have been tried and it has been clearly demonstrated that decomposing milk injected into the udder at any time, produces within from twelve to thirty-six hours conditions identical with those of milk fever in the usual way, and post-mortem examinations point out almost identical abnormalities with that of milk fever, especially when the duration of sickness has been brief, proving conclusively that milk fever can be induced.

Treatment and Mode of Application.—As the symptoms of a well-marked case of milk fever are already well known to experienced dairymen, we deem it unnecessary to repeat them fully. When a good milking cow in high flesh just before or soon after calving becomes restless, paddles with her hind feet, lies down and rises with difficulty, the udder becomes soft and flabby, it is time to become suspicious that all is not right and immediate action should be taken. The herdsman, already provided with three sixty-grain doses of potassium iodide, carbolic acid and udder syringe of proper design, procures a liberal supply of freshly boiled water. The udder and teats should first be well bathed with warm water to which has been added a tablespoonful of carbolic acid to each quart. All milk should be drawn from the udder and one drachm (sixty grains) of potassium iodide should be dissolved in one quart of hot water (freshly boiled), with one dram carbolic acid, and in-



Parturient Apoplexy.

Fig. A. Instrument for administering Schmidt Milk Fever Treatment.

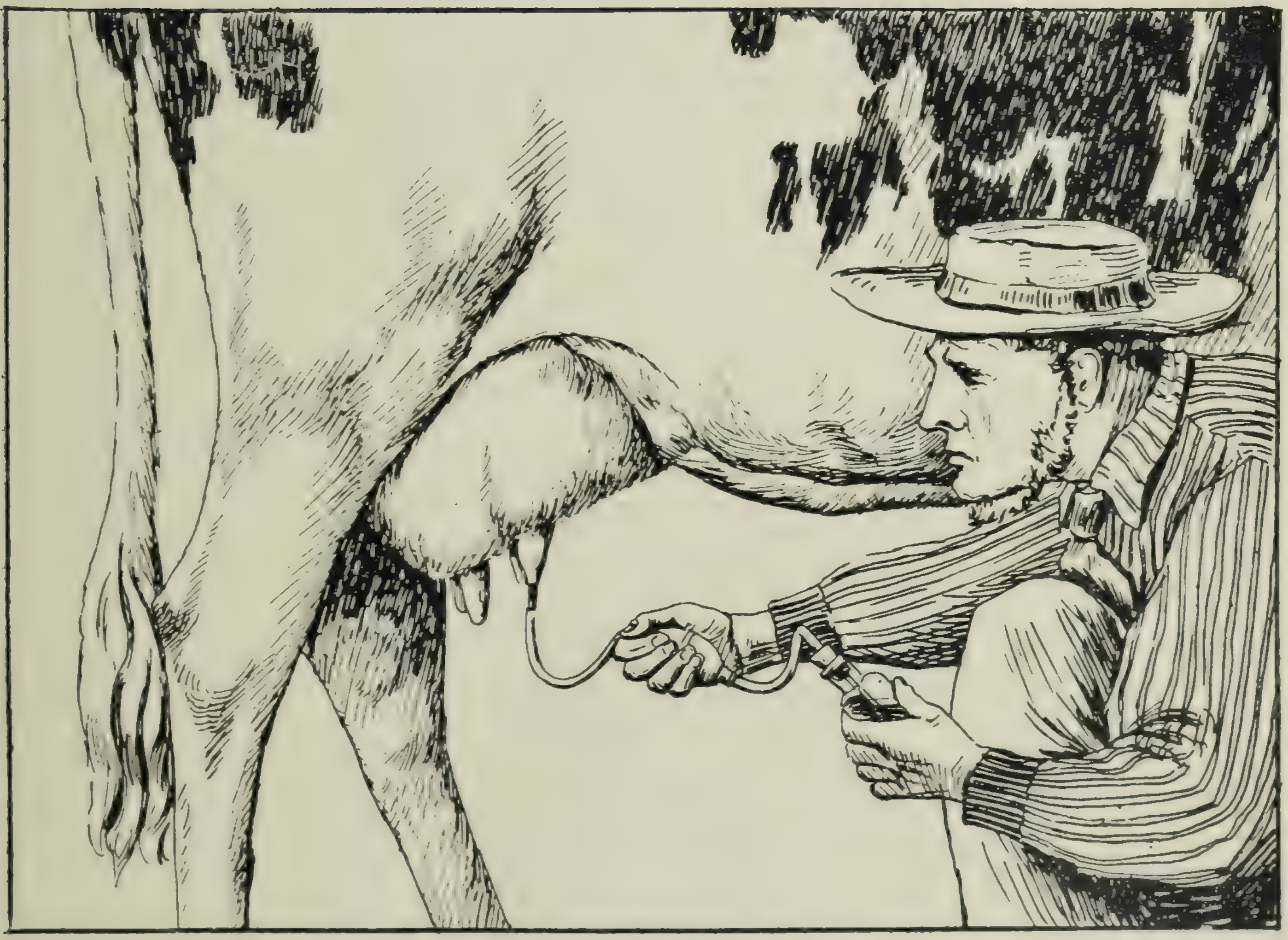


Fig. B.—Instrument as it appears in the hands of operator.

jected into the udder through the teats—an equal quantity into each teat. The patient should be kept dry, warm and free from excitement or noise, and in no consideration should drenching be done so long as any acute symptoms are present. The patient should be turned from side to side every four hours, taking care to avoid injuring the udder, and the udder injection given again in six hours, if signs of return to consciousness are not present.

In the hands of European veterinarians reports come to the effect that 90 per cent. of 412 cases so treated made complete recovery. Various doses were experimented with, varying from one-half to two drachms of the drug, and although the smaller dose was repeated at shorter intervals the one drachm doses gave best results, while a double quantity producing alarming symptoms and did not appear to exert any more favorable influence over one-half the quantity, which appears perfectly safe.

How Does Potassium Exert Its Influence in Such Cases?—Long before potassium iodine was associated in this way in the treatment of milk fever, it was a well established fact that it exerted a stimulating influence upon the base of the brain and great nerve trunks when administered in large doses, and it is in this action that it counteracts the depression present in that malady. It also, no doubt arrests the decomposition in the udder when brought into the direct contact with the udder content. Having a powerfully stimulating effect upon the lympathic glands, it also hastens the elimination from the system of the offending poison.

Form of Instrument Most Suitable for Its Application.—Various instruments have been recommended for the application of the udder injection, but the instrument portrayed in the accompanying cuts seems to fill the greatest number of requisites with fewer objectionble features than any other we have seen. (See cut A.) The large glass bottle, No. 1, holds the required quantity (half pint) for one quarter (one teat). This bottle can easily be cleansed. It can be brought to the proper temperature by immersing in hot water for a few minutes previous to its use. The rubber tube (2) is connected over the end of a glass tube which runs to the bottom of a glass bottle (No. 1), thus minimizing the danger of air being pumped into the udder with the solution. The remaining portion of the instrument consists of a bulb syringe (Fig. 3) to which is attached a milking tube (4) which can readily be detached for the purpose of cleaning, previous to inserting the silver tube into the teat. The bottle (No. 1), should be filled with the prepared solution at 102 degrees F., and the syringe pumped full, which also forces out the air, and as soon as the contents of the bottle (No. 1) is emptied, the operation of the bulb should cease, so as to avoid the introduction of air into the udder, as air hastens decomposition and thus delays recovery. Great caution is also necessary to avoid the introduction of foreign substances, hay-seeds, etc., which may drop into the vessel containing the medicine, as such will produce damaging results upon the udder. Everything must be kept scrupulously clean to secure the best results. Cut B shows the instrument in actual use with the tube inserted into the teat and shown in the correct position in the hands of the operator.

Can the cow be given any treatment previous to parturition that will prevent retention of placenta?

Dr. Smead.—Before answering this question direct, it may be well to call attention briefly to the generative organs of a cow. On the lining membrane of the uterus may be found from 50 to 100 protuberances, or lumps, in farmers' parlance; after the cow becomes pregnant and a membrane or skin is formed about the embryo calf, a similar lump or protuberance is formed on this membrane adhering to the one on the membrane of the uterus. These, in both cases, are called cotyledons. It is through their adhesion that the calf is furnished nourishment in its fœtal life from the blood of the mother; when there are perfect normal conditions. Soon after the calf leaves the uterus, nature, true to herself, breaks loose these adhesions, and the placenta or after birth—another name for what farmers call the cleanings—is expelled from the uterus as it then has accomplished its office work in the development of the fœtus. We thus see that the retention of it beyond from twenty-four to forty-eight hours, is due to some abnormal condition. It is, therefore, our study to determine what those conditions are, and what will overcome them. First, the cow may have a protracted labor and there is exhaustion of the uterus and total lack of after or secondary labor pain, and the placenta remains in the uterus simply because the uterus has not the power to expel it. The veterinarian would in that case give a dose of ergot; but a farmer had better use a more safe and just as effectual a stimulent, that is a gill of whiskey and a tablespoonful of good ginger mixed in a pint of warm water (being sure to give the whiskey to the cow as well as the ginger). This can be repeated in from four to six hours. If labor pains are produced and the placenta is not expelled, there are good reasons for believing that the adhesions have not separated and no uterine stimulant will cause expulsion. In cases of that kind I have observed that there is always present a dry and fevered condition of the uterine membranes. It is largely through aluminous mucus that these adhesions are broken loose, and when there is a lack of this mucus (due to a fevered condition), the remedy should be to supply it as far as possible, and that can best be done by giving the cow laxative drinks and mashes, like flaxseed tea; an ounce of gum arabic can be dissolved in two quarts of warm water and injected into the uterus with a proper syringe. But the question calls for a preventive; yes, that can be furnished by keeping the cow in a normal condition during the year, or rather year in and year out. One abnormality calls for and produces another. When the cow is allowed to become abnormally weak or abnormally fat, she becomes abnormal in her uterus and a fevered condition locally, if not in general, takes place in her uterus, and there is no mucus to separate the adhesions after the calf is born. The question involves an answer for something to give in order to prevent. The answer is, give the cow good care which means also feeding a balanced ration when dry as well as when in milk, and during the last month of pregnancy a quart of oat chop and a tablespoonful of ground flaxseed (I don't mean linseed-oil meal), but the whole flaxseed ground. This can be given two or even three times daily, and will in most cases prevent the retention of the placenta. If the cow is on pasture the flaxseed may generally be dispensed with; but the oat chop I consider an essential. The oat meal diet so often prescribed for a pregnant woman, is just as beneficial for a cow in more ways than one, and this is one of them. Medicinal agents have been recommended by various authors for a century, but I never have found one of them of any benefit whatever as long as the adhesions remain. The better way is to feed the cow in a manner that will prevent this abnormal condition, and oat chop and flaxseed properly used will do more to accomplish this than pounds of drugs.

THE GRASSES.

What will make the best combination of grasses for an upland pasture?

Mr. Van Alstyne.—Orchard grass, 4 pounds per acre; the same proportion of white clover, red-top, and the same money value of Italian rye grass and meadow fescue.

How shall we seed to "blue grass"? What soil is best, and how much seed per acre?

A Farmer.—I sowed seven bushels of seed on 20 acres a few years ago. I sowed it for both meadow and pasture. It did well. I suppose I sowed what is known as Kentucky Blue Grass, which I am informed differs from our State blue grass.

What varieties of grasses would you put on a steep hillside for a permanent pasture?

Mr. Cook.—I don't know. It would depend on the soil somewhat. Possibly a mixture of blue-grass, timothy, some clover and the fescues would be best. It is a question that is too indefinite to answer fully.

Will Kentucky blue grass do well on New York soil? If not, why not?

Mr. Cook.—What is known as June grass in many localities is nothing more or less than Kentucky blue grass. It is hardy in nearly all parts of the State and makes the best of June pasture.

How can quack grass be killed?

A Farmer.—I have killed quack grass on a field by growing tobacco one year.

Mr. Cook.—I incline to the belief that quack is a good grass to have. It is one of nature's ways of restoring humus to the soil, as it has a wondrous root growth. Then, too, it makes good pasture. But we kill a piece every year, no matter what the weather is, and it stays killed. We grow foods for dairy cows—oats and peas, three or four sowings, the last one, about the latter part of June. We take a piece of land full of quack, plow it deeply, early in the spring, then use a heavy disc harrow, weighted so that it requires four horses to draw it. We never use a spring-tooth, because it drags the roots all over the field, and, in a few days, if you do, the whole will be covered with a green coat. But the disc harrow will chop up the roots finely. Then we sow a crop of oats and peas—three bushels to the acre—this will smother the quack crop, in great part. When the crop is off, we plow the land, fit it well and sow to winter wheat and seed with clover. The next year there is never seen a spear of quack. The only way to kill a crop like quack is to stop its growing. Clutivation and the growing of such crops as I have named, will do it. Use the disc harrow every time, and use it often, till you are ready to sow the oats and peas. It will chop up the roots very finely, which leaves them when dead, in good condition for humus in the soil.

How can we best secure permanent pasture?

Mr. Terry.—I do not know what grasses would do best here (Weedsport), With us, "blue grass" is the best.

Mr. Van Dreser.—We use a mixture of red top, blue grass and alsike on low land. On upland, some timothy and clover are sown.

At what season do you recommend the cutting of timothy hay for best feeding results?

Dr. Smead.—I would not feed timothy hay to any animal; but, as it is being fed, and no doubt always will be, we must consider its food value. To get the most and best of that, timothy hay should be cut just as it goes out of the blossom.

If you were seeding a poor piece of land for pasture, what kind of seed would you sow?

Mr. Cook.—I would use orchard grass for one-half. The remainder I would have of meadow fescue, alsike, and perhaps, some other grass. But, if the land was natural pasture, I would top dress it liberally. I believe that better results will be thus obtained than to plow the pastures and reseed them.

Has anyone had any experience with brome grass?

Mr. Cook.—I don't know it. Does any one here? Director Dawley is experimenting with it at Fayetteville this year.

Is there as much moisture in timothy hay as in corn at the same stage of growth?

Mr. Cook.—I do not know. There is about 12 per cent. of moisture in dry timothy. I don't know how green timothy compares with green corn-stalks.

Mr. Moulton.—The stem of timothy is hollow; that of corn-stalks solid; so I do not think there is as much moisture in the timothy as in the corn-stalks.

What is the feeding value of timothy hay, and how does it compare with clover and corn ensilage? Will Mr. Gould please answer?

Answer.—There are but 750 pounds of digestible matter in a ton of timothy hay; the balance is sawdust. In clover there is 14 per cent., nearly twice as much digestible material, while oats are very nearly evenly balanced. To get the best results from clover and corn, cut the clover early and properly cure and house it; properly cultivate the corn crop and when in the proper stage, put it in the silo. A cow requires 14 pounds of digestible starch each day. To get it from these stalks, she would have to eat 45 pounds, which she could not do. In ensilage the ratio is still wider, being 1 to 17. But remember, the ensilage is succulent, not dry, and there is more of it that is digestible. Clover and timothy do not compare, any more than do corn and wheat bran. We grow the two crops to obtain entirely different results, our aim being to secure starch and protein. We, therefore, grow the timothy—if we do grow it—to obtain starch; clover to obtain protein. Both are essential; but, I would not grow timothy except I could afford to grow and sell it, because I can secure so much larger per cent. of starch on a given area, from corn. I am satisfied that the farmer can easily raise 6,000 pounds of starch on one acre, while he will have to have a good season and well conditioned meadows to raise 1,500 pounds of starch in timothy hay. So it is easily seen that it is much more profitable to grow starch in the form of corn ensilage than it is to grow it in timothy. But, while a ton of hay will lay in a mow three or four years and not lose much of its feeding value, a stack of stalks, if left till next spring, will lose at least 60 per cent. of theirs. In short, the farmer must first learn what crops are best, then grow and feed them in the best form for the purpose for which they are required.

How shall we best reclaim old hillside pastures?

Mr. Cook.—I don't know just what I would do. It's a problem. We have lots of that hillside land in this State. Perhaps it would be as well as any way to put sheep on it.

VETERINARIAN.

What will kill pin worms in horses?

Dr. Youngs.—A mixture as follows will kill them: Oil meal fairn, ½ ounce; oil of turpentine, 2 ounces; linseed oil, 1 pint. Mix thoroughly and give a tablespoonful morning and night in the grain food, during ten days. Stop ten days, then give it again; repeat three times. It will require a period of about thirty days to perfect a cure.

What will prevent abortion in cows?

Dr. C. E. Hatch of Gainesville.—"Phreynol" is highly recommended. It costs $1.25 per gallon. It is used as a drench or wash and is quite reliable, fully as much so as are the patent anti-abortion preventives.

What will cure gapes in chickens?

Mr. Chapman.—There is no cure for gapes. The best way is to prevent them. To do this, keep the chicks on hard floors and have them dry and clean. Gapes are caused by a worm which gets into the chicken's throat. If they are kept on board floors they will not get hold of the worms.

What is a good remedy to stop the flow of blood when an animal has been cut on barbed wire?

Dr. Smead.—That depends where the cut is and the magnitude of the blood vessel—a vein or artery. But the owner or doctor should not get excited, but keep cool. If the wound is on a limb and an artery has been cut, take a rope and cord the limb above it. If the cut is very large and there is a liability of the horse bleeding to death, the artery will have to be taken up. But every man cannot do that. To check the flow while waiting for the doctor, apply some muriate of iron. Every farmhouse should contain it. If the cut is mangled, cut out the broken or threaded pieces of flesh, then use a little carbolic acid—a teaspoonful to a pint of water—wet some cotton with it and bind it on the wound.

What will cure intestinal worms in sheep?

Mr. Van Dreser.—I know of nothing better than some of the sheep worm powders. There are a half-dozen of them. I don't remember the names—could not recommend either one. We feed them two or three times a week. Sometimes the worms come from old pasture grass.

What will kill lice in hens?

A Farmer.—That's what I want to know; there is a million on my hens.

Dr. Smead.—There are two species of lice that get on to hens. One is the little red mite that gets onto the hen in the night, but goes off and crawls into some crevice in the walls during the day. They do not stay on the hen during the day. Spraying with kerosene emulsion and whitewashing the walls and perches will kill the mites. The large gray louse lives on the hen all the time. To kill them blow Persian insect powder into the feathers a few times.

A Farmer.—A ball of camphor placed in the nests will kill the large lice.

Mr. Van Dreser.—Prepare a dust bath in a box, by putting in some sand, in which sulphur has been mixed, and allow the hens to wallow in it. Tansy in the nests will also kill the lice.

What will remove the diseased scales from the legs of poultry?

Mr. Ward.—They are caused by a parasite. Some one of the sheep dips, or diluted carbolic acid, will remove the scales. Wash the legs with it.

What will cure thrush in a horse's foot?

Dr. Smead.—Use either blue vitrol or calomel, after thoroughly cleaning the foot and cutting away all of the diseased frog.

What shall I do for a horse which has a "strain," and what is a good remedy for scratches on horses?

Mr. Converse.—Give some condition powders; then rub some carbolized oil on the scratches. I do not know what to do for a "strain." Possibly some of the liniments would be best. Consult a veterinarian.

What is sure death to lice on cattle and hens?

A Farmer.—A quart of good cider vinegar mixed with two quarts of water will kill every louse on cattle or hens.

Mr. Ward.—If you are so unfortunate as to have lice on your cattle, you will find nothing better than some one of the carbolic sheep dips, using one part of the dip to 50 of water. The mixture is good for many other troubles on sheep, cattle or poultry. In Scotland these dips are used to wash the legs of Clydesdale horses to promote the growth of hair.

Mr. Litchard.—Equal parts of lard and kerosene oil, rubbed thoroughly into the hair, will kill them. Not more than two or three applications will be necessary.

Mr. Cook.—If an animal is very lousy, diluted carbolic acid will kill them. Blanket the cow, then when the nits hatch give her another washing.

Mr. Ward.—Kerosene, lard and tobacco juice will kill cattle lice, but they are nasty and sticky remedies, while the carbolic dips are clean and just as available as are the other prescriptions.

What is good for scab on sheep?

Mr. Cook.—I suppose that means "What will remove scab on sheep?" What do you say, farmers?

A Farmer.—Use some one of the carbolic sheep dips. There is nothing better to cure sheep scab.

Dr. Smead.—Turn the sheep on its back, then pour a pint or more of some one of the sheep dips, from an old teapot, into the wool on the sheep's belly. It will go directly to the skin, covering it all over, without wetting the wool.

Why do cows chew pieces of boards and the siding on the barn, and what do they want when they have salt before them all the time?

Mr. Converse.—It is caused by a lack of mineral matter in the food. A little ground bone mixed with the grain ration will correct the habit.

Mr. Powell.—No doubt there is a deficiency of mineral matter in the food. Straw, cornstalks, timothy hay and other such foods are short of this mineral element. I would add some wheat bran, linseed meal, gluten or cotton-seed meal to the ration. We seldom see cattle chewing bones or boards when running in pasture in summer, nor when their rations are properly balanced in winter.

What is the best remedy for small white worms in horses?

Dr. Smead.—I suppose that refers to pin worms. There is nothing better than the skins of potatoes. Peel off the skins, having them thin, and give every morning about two quarts; do not feed them anything else, until after an hour.

What shall we use to kill nits on a horse?

Dr. Smead.—There are many things, but one does not always want to use the same thing on a horse that he would on another animal. Steep a handful of tobacco leaves in two quarts of water, then wash the horse. One application is enough.

What should be done with a cow that is to freshen in hot weather, to prevent loss from sickness or death?

Mr. Cook.—Keep her in the barn and feed her a little hay, some grain and a little grass. Do not turn her out into a good pasture and allow her to fill herself with grass, because it stimulates the milk-producing functions too much, which tends to produce milk fever.

Why do pigs become lame and stiff? They are fed ground oats, corn and bran and have exercise.

A Farmer.—They need more exercise.

Another Farmer.—They have worms.

Mr. Converse.—Possibly it may be caused by rheumatism, or it may come from feeding too much corn meal.

Mr. Chapman.—Ofttimes the trouble comes from intestinal worms; a mixture of charcoal, salt and ashes put into the food, will very often effect a cure.

To Dr. Smead.—What do you think of the barbarous practice so many have, of feeding ashes and salt, mixed, to horses?

Answer.—The man who believes in that practice ought to take a dose of the mixture every day for a week. At the end of that time, if he is alive and likes the stuff, let him come around and tell me so. I shall then have nothing more to say.

What would you give a cow that has "run down" since she dropped her first calf and has partly lost her appetite?

Mr. Weaver.—There is a preparation—a tonic--that seems to benefit such a cow. I have not the prescription, but it contains some ginger, gentian, saltpeter, Peruvian bark, etc.

Mr. Cook.—A warm bran mash, if the cow will eat it, will be found about as good as the medicine. Don't spend a whole lot of money for these prepared, patent right foods and tonics. Some of them are good in their way, but they cost ten times as much as they are worth. As a rule, they contain 90 per cent. of linseed meal. They are just about as much of a fraud as is oleomargarine. Don't buy them. If a cow is ailing, call a good physician or veterinarian; or, as we always have some farmer among us who has had experience in doctoring sick cows, seek his advise. As a rule, he will know what the matter is and what to prescribe.

Are cattle benefited by being dishorned?

Dr. Smead.—I think it a benefit to dishorn the whole herd; but where one has but one cow I do not know that she will be benefited by it. As a rule, those who have had their herds dishorned are more than satisfied with the results. Indeed, I do not know of a dairyman who has had his herd dishorned who regrets his action.

At what season is it best to dishorn cows? Is it too late now?

Mr. Converse.—At any time when the flies are not plentiful. Cut them off now, but don't allow them to go out in the cold.

What is the most humane method of dishorning cattle?

Mr. Van Alstyne.—I think the clippers are best. We want to be quick about it, just as we would if we were to have a tooth pulled—we want to have it jerked out as soon as possible. I do not use the saw any more or take the cows out of the stanchions. There is no excitement of the cow, and but little blood to flow. But I know of a cow that bled to death; but it was the fault of the owner. We cut the horn close to the frontal bone, put on carbolized lard, then applied flour. If that does not stop the flow we apply spider's web.

If a herd of cattle has a cough, is it a sign of tuberculosis?

Mr. Converse.—That is a symptom, but the animals may not have the diseases. If one of my cows had such a cough I would call a veterinarian. But we have had cows which had such a cough, that did not have tuberculosis at all.

Is there any visible degree by which we may judge whether a cow has or has not, tuberculosis?

Dr. Smead.—Yes, when the disease is in an advanced stage; there are signs, but none when the disease is in the incipient form. I would require some external evidence before I would use tuberculin. It would be an unwise thing to use it, until one had very strong evidence. It has caused the destruction of many animals that have been tested and killed. Upon examination it was found that the tubercles in them were encysted and had become entirely harmless. Some of the signs of tuberculosis in an advanced stage, are dull, watery eyes, languid appearance, degenerated appetite, a cough and a dry, hot feeling of the hair, etc.

What is the cause of tuberculosis; and is it catching?

Mr. Van Dreser.—I believe it is caused by a lack of constitutional vigor. I know of whole families who have died of consumption, but I do not believe it is catching; that is, I do not believe that a person perfectly healthy will catch tuberculosis—consumption from one sick with it.

Mr. Cook.—If you or I have a cow sick with tuberculosis, I think it is our duty to kill and bury her, and not wait for some man with a syringe to come around and puncture her, and then we ask the State to pay for her.

To Dr. Smead.—What are the first symptoms of the disease called tuberculosis? Is a cow troubled for some time before coughing begins?

Answer.—There are two questions involved. The first symptoms of tuberculosis in cattle or in any other animal, are very similar to those in the human. As a rule, at first is a general unthrifty appearance, which is followed by a cough. But the animal may cough and not have it. The cough caused by the disease is usually continuous and increases when the animal is hurried. The next symptom is a craving appetite. These are the first principal symptoms. The second part of the question—difficulty of breathing—may not be a symptom. It may be caused by some trouble in the nostril. One will have to investigate for the purpose of ascertaining whether such difficulty is caused by lungs or nostril disease. But, don't go away thinking that tuberculosis is a new disease. It is more than 2,000 years old. If you have a cow showing these symptoms don't imagine the whole herd is diseased. One animal may have it only. If you find such a one, quarantine it and give it the best of care and attention, and await results. Call some capable veterinarian and abide by his advice. If in time, the disease develops to such an extent that you are satisfied it has become chronic, slaughter and bury the animal.

Is abortion in cows a disease? If so, what is the remedy?

Dr. Jordan.—This question cannot be fully answered. Dr. Law of Cornell says he "gives it up." Good sanitary conditions, proper care, and a close watch upon the herd is advised.

A farmer present said that his herd, particularly the heifers, were most badly afflicted with the epidemic.

Mr. Cook.—I have no remedy; I wish I had. Several years ago thirty-six cows out of fifty in our herd, aborted. The second year the trouble came again, but in less number. Since then but four cases have occurred. When we have a case in our herd of 100 cows, we immediately quarantine the cow. Sympathetic cases have occurred in our herd, so that it is of the utmost importance that such cows should be isolated at once.

Captain Murphy.—I once had a heifer kick me on the knee; I gave her several cuts with the whip because I was angry; a few hours later, the heifer aborted. I was the cause of it. At another time one of my men was driving some cows to a fair; a railroad train came along and frightened them so that they ran down the railroad bank. A few hours later some of them aborted. I believe the disease is a nervous one, as it always occurs in our best cows.

Is there any cure for roup in hens, if so, what is it?

Mr. Van Dreser.—The cure is prevention. We have a large flock of hens, but when I was at home there was not a case of roup among them. If the houses are kept dry and no drafts of cold air pass through, it will not appear. Dampness causes it and dampness means death. If you find a hen sick with roup, the best way is to take her head off and bury her. Ground floors are damp; while rats will gnaw through board floors, so we use cement, but they are kept covered with straw; and straw should be kept on a board floor, so that the grain ration may be sprinkled in it for the hens to scratch, to give them exercise.

Dr. Smead.—Roup is caused by dampness, but there are three classes of it among hens. One is an influenza, one diphtheria, the other what is known as roup. To avoid these diseases, we should have plenty of sunlight to destroy the germ that is destroying the hen. Then ventilate the house and remove the droppings often. If you have a valuable hen, quarantine her by removing her from the flock, then mix one part of carbolic acid with ten parts of linseed oil and sponge the head and face of the hen. We call it "carbolized oil."

Will sour milk cause indigestion when fed to calves?

Mr. Cook.—Not if fed carefully. As a rule, indigestion is caused by over-feed or by feeding too rich milk to young calves. But I would not feed very sour milk. There is a tendency on the part of most of us to over-feed the calf. I believe that mildly soured milk will not injure the calf, but I should prefer not to give the calf milk until it is two or three weeks old, milk containing more than two to three per cent. butter fat; later, I would feed skim-milk, sweet.

Is it well to give a horse linseed oil in his feed as oil meal? If so, how much would you give?

Dr. Smead.—Oh, no; linseed meal is a food very rich in protein, which makes blood, bone and muscle. Linseed oil is a medicine which is used sometimes in veterinary practice.

INJURIOUS INSECTS, INSECTICIDES, FUNGICIDES AND SPRAYING.

Is there a preventive of the "Buffalo fly?"

Prof. Felt.—I know of no remedy. Lime sprinkled on the droppings is doubtless the best preventive. We may keep the stable dark during the day, or spray with kerosene oil, but most of these remedies are only temporary.

Is there any remedy or preventive of the railroad worm in apples?

Prof. Felt.—The only remedy is to destroy the fruit, pick up the apples and feed them to hogs. Spraying will not affect the apple maggot. It will the codlin moth, however. We know that the moth does not fly far, so that if one takes care of his orchard, even if his neighbor neglects his, the insect may be quite largely obliterated in any one orchard.

· Is the kissing bug dangerous?

Prof. Felt.—It is a myth. I have the pictures of at least sixty different bugs, all looking unlike, of the so-called "kissing bugs," in a scrap book, and all collected from different papers.

What will kill the pumpkin bug?

Prof. Felt.—I don't know what is meant by the term pumpkin bug, but I suppose the striped cucumber beetle is the bug. It may be driven off by spraying with some emulsion.

A Farmer.—I soak a piece of cloth in kerosene, tie it around a stick, and thrust the stick into the hill. Unless it rains it will keep the bugs away two or three days at a time. The scent of the oil keeps the bug away.

Prof. Felt.—I do not wish to discredit what the gentleman says, but I would not want to recommend anything as a *positive* cure until it had been universally used and proved to be effectual.

What is the so-called kissing bug?

Prof. Felt.—It is a smooth, shiny brown creature and has a wicked look in its eye. It resembles a squash bug somewhat, but if not disturbed does not bite.

Does the bite of a mosquito ever cause malaria or fever?

Prof. Felt.—Investigation made with certain species of mosquitoes in Southern Africa, where malaria is quite prevalent, shows that this is true somewhat, but they are confined to certain pools. Kerosene placed on the water where the mosquitoes breed, is said to exterminate them.

What is the best remedy for killing humbugs?

Prof. Felt.—I believe that the best receipt for killing humbugs is education. I know of none better.

What shall we use to prevent the lumpy, bumpy, humpy conditions of some of our apples?

Prof. Felt.—I have been recommending arsenate of lead for spraying purposes when a second brood comes on, because it adheres to the leaves so firmly; but paris green or london purple are good. However, it does not pay to save five cents' worth of poison. Almost any of the poisons are good and I do not care to distinguish between them.

What is the name of the insect that causes the humps on apples?

Prof. Felt.—I am free to say that I do not know what the insect is. The only way is to watch the apple. A gentleman told me to-night that he had watched the apple all through a season and had been unable to locate the cause. I shall investigate and study it, however, as soon as I have a chance.

What is the remedy for the insect that attacks cherry trees? It attacks the leaves at the time of blossoming, curls their ends and blights the blossoms. The inside of the leaf along the main veining is covered with black insects that presently become flies. These black insects seem to attack the new leaves. I have tried soft soap, kerosene and paris green without success.

Prof. Felt.—I have but little doubt that it is the work of some plant louse. I would use some insecticide that will kill the lice when it touches them. Whale oil soap or kerosene emulsion will kill them; but one must begin early and be thorough. Poisons will not destroy them for the reason that they do not eat, but suck the juices out of the leaf, instead.

What shall I do to kill the lice or slugs on my roses?

Prof. Felt.—These slugs on the roses are of a family of aphis. Make an emulsion of soap kerosene and spray the roses with it, making it strong.

When is the proper time to scrape trees to kill the codlin moth?

Prof. Felt.—At any time in early winter or late fall will answer the purpose.

How often should orchards be sprayed to kill insects or worms?

Prof. Felt.—We spray orchards to kill insects and prevent scab, but there are two classes of insects, one sucks, the other eats, the latter may be killed by spraying with poisons, the other must be fought with emulsions. They breathe through holes in their bodies; kerosene emulsion, sprayed on them will stop up these holes, and this will kill the insects. If we are to spray, we should know when and how to do it, and do it after the blossoms fall; spray two or three times.

What will destroy the oyster shell scale?

Mr. Van Alstyne.—The oyster shell bark louse or scale is easily removed by washing the tree with strong lye. As a rule, this scale only gets on to feeble, unhealthy trees. I don't know as I ever saw it on strong, well-fed, healthy trees.

Will Mr. Fenner please tell us with what he sprayed his pear trees?

Answer.—Paris green, 1 pound, with 100 gallons of water. Sprayed the pears three times, when the fruit was about the size of robins' eggs. We also spray with the Bordeaux mixture, just as the buds are starting; again later.

Mr. Cook.—How many of the farmers here have sprayed their orchards? Hands up!

A number voted, and one or two said they got excellent results —better than ever before—last year. One farmer said he got as good results from not spraying as did those who sprayed near him.

Mr. Cook.—You are like the man over at Mexico who said he got better results from the aquatic creamer than from the centrifugal separator.

What shall we do to save our plum trees from black knot?

Mr. Van Alstyne.—The black knot comes from a fungus. There is no way to hold it in check, or cure it by spraying. The only sure way I know is to cut out and burn all affected limbs; then I should apply some turpentine. It is said it will prevent the disease from spreading. If the tree is badly affected it is best to cut it down and burn it.

Is there any way to ward off the so-called apple maggot?

Mr. Van Alstyne.—I know no way of fighting this maggot. It seems to take more kindly to Talman sweet and other like colored apples, like Greenings and Fall Pippins, because they are thin skinned. I know of no way but to stop planting these varieties and allow the hogs and sheep to run in the orchard to eat the wormy apples as fast as they fall.

Mr. Houck.—This maggot also works on Baldwins and Spitzenburgs.

Will Mr. Van Alstyne give us his experience for or against spraying his orchards?

Mr. Van Alstyne.—I do not believe I do a day's work in the year that pays me so well as that spent in spraying my orchards. It is a nasty job and I hate it because, sometimes, my wife hardly knows me when I go into the house. But I am not advocating it here because I want to say something at an institute, but because I know that we cannot be sure of fruit at all seasons unless we do spray, but it must be done thoroughly and intelligently. We spray for two purposes: To kill insects and to prevent scab on fruit, and leaf blight, using the Bordeaux mixture for the latter and poison for the former. After the blossoms have fallen and the fruit has set, we mix the poison with the Bordeaux, so that two purposes are served at the same time. Spray with the Bordeaux first—just as the foliage is coming out, and do it so as to cover the whole tree; later, add the poison to kill the insects—codling moth, tent caterpillar, canker worm and other insects that work on the fruit. And I would spray my orchard with the poison and Bordeaux if there were not an apple in it; not so many times, but I would spray to prevent leaf blight and to kill insects that work on the foliage, as, unless we grow a good crop of foliage this year, there will be no fruit buds next year, and, therefore, no fruit.

What will kill lice on currant bushes?

Prof. Stewart.—I have heard our entomologist say that there is not much hope for the currant leaf, if we wait till after the leaves are well out. But he intends to begin experiments by spraying the buds before they are very far out, with the kerosene emulsion and hopes to succeed. When the leaves are out the aphides cannot be very easily reached, for the reason that they work from the under side of the leaf, where they suck the juices from between its walls.

What are the eggs on these maple twigs? Please notice them. Some twigs are covered with these eggs. What will kill them?

Mr. Van Alstyne.—Those are the eggs of the forest-tree caterpillar that works on the maples. The only way is to destroy the eggs. If they are allowed to hatch, very many will escape. Where they are on the ends of the twigs they may be clipped off. They are easily distinguished from the tent worm of the apple tree, and one ought to examine the trees and destroy the eggs. Green arsenite and arsenite of lead are also used in the spring and summer, the latter being much cheaper than the paris green; but it must be cut with potash, and, unless care is taken, the foliage will be burned. If the difference in price, as between the paris green and green arsenite was not much, I should use the former. If the difference was more than three cents I should use the green arsenite. It is more soluble and remains in suspension longer than does the green, and, therefore, does not need so much agitating while being sprayed on the trees.

What is the cause of bugs in beans and peas, and what is the best way to dispose of them?

Mr. Converse.—The worm is caused by a fly which punctures the pod and lays an egg, which produces a worm. The worm turns into the bug which we see. Bisulphide of carbon is the remedy. Saturate a sponge with it and place in the bin or barrel holding the beans or peas, then cover it tightly with a blanket. The gas is heavier than the atmosphere; therefore settles. It is not only deadly, but highly explosive; therefore, do not go near it with any fire, and be careful not to inhale it.

Does the planting of potatoes deeply, then hilling them up, prevent rot?

Prof. Stewart.—It might in some cases. The spores in the blight fall on the ground and are washed into the soil by the rains, where they fall on to the tubers and cause rot. So that, under certain conditions, if the potatoes are planted deeply the spores cannot be washed down and lodge on the tubers, while those lying near the surface will be inoculated. When the potatoes are hilled up, if the season is wet, the spores are washed off and into the spaces between the rows. That is a part of the explanation of the remedy. Spraying with the Bordeaux mixture will be found a much better and surer preventive than the hilling-up system. I had much experience on Long-Island during one season, where we sprayed eight acres. We got no blight on either the sprayed or unsprayed vines. It cost $4 per acre to spray those potatoes, and, although we got no results in one direction, because the rot did not appear, we got 63 bushels more per acre on a piece of "White Elephant" than we did on the same area of the same variety that was not sprayed. But we used paris green mixed with the Bordeaux, which killed the potato flea beetle and other insects which feed on the vines. But it is the soft, stringy rot which the Bordeaux prevents. The dry, hard rot is a disease which works below the surface and will not be prevented by spraying. No disease working under ground that is not caused by something attacking the plant or vines above ground, will be prevented or cured by spraying. The hard, corky rot is not caused by leaf blight, but by a soil germ. So that spraying the vines will not reach the tubers.

Is there any spray that will destroy the moth spots on apples?

Mr. Tyler.—It is not the regular scab that is meant. To prevent the regular scab fungus, the Bordeaux is used as a spray. I spray before the buds open; then twice after the blossoms fall.

Would you spray for potato blight? If so, what ingredient would you use?

Mr. Litchard.—We have had but very little blight in our locality. I use vitriol, 4 pounds, and stone lime, 6 pounds. It is, practically, Bordeaux mixture.

Does the forest tree worm kill the timber?

Mr. Cook.—It would depend how severely he worked on the leaf. I don't know what can be done economically to kill them.

Of course they may be destroyed by spraying or by hunting out and crushing their cocoons, but that is out of the question in the forests. We can kill the apple tree worm, easily, but that is another worm. The apple tree caterpillar has a tent, the forest tree does not.

Is the maple tree catterpillar likely to kill our trees? Which is the best way to get rid of them?

Mr. Cook.—That question comes up at every meeting, but I don't know what to say. We can kill the apple tree worm, but the forest tree worm is another fellow. If we can reach them, paris green will do it, and I think the best way will be for the village board to take hold of it, and employ men to spray the trees in the village. When it comes to spraying the forest trees, however, it cannot be done. But some of the cocoons may be hunted out and mashed. We ought, I think, to give more protection to our song birds, which are our best friends. The women ought to make a stampede against wearing any more dead birds on their hats, and, instead of encouraging their slaughter, to protect them. We make too much fuss because the birds take a few berries.

A Farmer.—I have known men here to shoot a half dozen robins because they took a quart or two of cherries.

What is the best way to prevent or destroy the San José scale?

Mr. Cook.—Spraying with kerosene emulsion is said to hold the scale in check somewhat; but, to be sure of eradicating it, fumigation with hydrocyanic gas is the only cure so far known. But it cannot be applied to large trees.

Mr. Van Alstyne.—The scale is here in great numbers in some places. Long Island is filled with it, and it is in the Hudson river valley. A neighbor of mine has been fighting it in his orchards during the last ten years, and doing it intelligently, but he told me that it made greater headway last year than ever before. I have it on my currants, plums and peaches, and it may be on my pears, but I do not think there is any in my apple orchards; but it is in others in my vicinity, (Kinderhook), and I have come to believe that it is here to stay, and it is our duty closely to examine all our trees and shrubs and to spray them, and, if we find it very prevalent, cut down the tree and burn it. It will not do to pass the matter lightly and thus neglect the trees, else all our orchards, shrubs and, it may be, our forest trees will soon be destroyed. Nor should we buy nursery stock of any one that has not been thoroughly inspected or fumigated. All the nursery stock sent out of the nurseries in Maryland is fumigated with hydrocyanic acid gas, which kills all insect life on it, and the result is that more orders are being received for stock there than the nurserymen can fill.

What is the best spray to kill the rose-leaf hopper? I have tried insect powders, whale oil soap, tobacco, etc., but they failed to have any effect on the hoppers.

Mr. Chapman.—Prepare a mixture made of 20 pounds of whale oil soap, 20 pounds of caustic potash, and 1 gallon tar. Put this in 100 gallons of Bordeaux and green arsenic. Spray the bushes with the mixture.

What is the remedy for blight on strawberries?

Mr. Converse.—Spray them before the blight appears, with the Bordeaux mixture. Do not wait for the blight to appear. Spraying will not cure, but prevent blight on strawberries.

What will prevent curl-leaf on the peach?

Mr. Mann.—I have sprayed with Bordeaux to prevent it, beginning just before the buds opened. Results so far are very satisfactory. I expected that Cornell would issue a bulletin giving full information ere this time.

Mr. Willard.—The foliage of the peach is very sensitive, so spraying must be done with great care.

At the meeting of the Western New York Horticultural Society, Mr. Powell of Syracuse, said that the San José scale could be communicated from apple peelings and orange peel, to trees, and thus spread. Was he correct?

Prof. Slingerland.—The San José scale does not work on the orange. That is another chap. There is a chance for a live scale to be communicated from an apple peeling to a tree, but only one in ten thousand. It may be carried from one tree to another on the feet of birds or by insects, or through the action of the wind in blowing leaves about. Fumigation is the best preventive, but it may be carried to such an extent as to injure the nursery stock, the gas being too strong. Care must be exercised in this fumigating process to prevent that. There are other insects that infest the trees which nurserymen are sending out that deserve much attention, such as the bud-moth, canker-worm, codlin-moth and others. Fumigation with the gas will dispose of those at the same time it does with the San José and other scales. Therefore he favored the process, when properly and carefully done. Another point: It is asserted that the nurseries of this state are free of the San José scale, and no doubt the statement is true, but there is not a nurseryman of any note in the state to-day who does not sell stock he does not grow. While his own stock may be free from the scale, that which he buys and sells again may be infested with it. So, then, to be sure there are no injurious insects of any species on this stock, he would have it fumigated with the gas.

Mr. S. D. Willard.—New York auction rooms are filled in the spring and fall with nursery stock from other states with inspectors' cards attached, which are placed there during transit or after the trees arrive, and yet upon examination by experts the trees are found infested with the scale. This must be stopped. We have scale enough now. It is on Long Island and in the Hudson river valley, but I do not believe it is in any of the nurseries of the state. It is the stock from nurseries from other states that must be looked after. New York, under the present law, is the dumping ground of all other states which send out nursery stock, and it is this which must be attended to.

What causes blight on bean leaves?

Mr. Wilson.—I have been troubled with bean blight. I suppose it is a germ disease.

Mr. Harmon.—I think the trouble lies in overdoing the bean industry. We are growing crop after crop and putting but very little fertilizer back in the land. If we would abandon bean culture two or three years, I do not believe we would be troubled with blight. For myself I would say I have never been troubled with it much.

Mr. Cook.—Bean blight is a specific germ disease and appears on rich land just as often as on poor land. Such is the case on Long Island, where commercial fertilizers are used very largely.

A Farmer.—My experience is that blight has done the most mischief on my richest land, therefore I do not believe that the disease is due to poor soil.

Mr. Cook.—Possibly spraying with the Bordeaux will prevent the appearance of the disease, but it must be applied to prevent its appearance, not to cure it. It will never do that, any more than it will prevent potato rot if the vines are sprayed after they have been attacked with the rot blight. We spray potatoes to prevent, not to cure, rot.

Will Mr. Van Alstyne say a word in relation to the elm tree beetle?

Answer.—We have sprayed our elms with paris green—half pound in 30 gallons of water. We have 175 elms which we sprayed, two men doing it in three days. They climbed the trees and used a hose among the branches. If you have elm trees, the village board ought to look after them. Purchase a pump then employ a competent man to do the work. The English elms in some sections have been nearly destroyed by the worm, but the natives, being stronger and having better foliage, seem to resist its attacks. If one will carefully watch them, many may be destroyed before they hatch, because the fly lays its eggs at the roots of the tree, and when they have hatched, the worms crawl up the tree and begin their work of devastation by eating the young foliage.

How shall we rid a field that we want planted with potatoes, of wire worms?

Mr. Litchard.—Begin long before you want to crop the field with potatoes to frequently plow, and a rotation of crops will in time rid the land of them.

Mr. Cook.—Salt has been recommended for the purpose of killing wire worms. It was tried at Cornell, but the result was, the worms not only lived through the test but actually became fat on the salt.

Is there any remedy or preventive of the cabbage grub?

Prof. Hall. If the cut worm is meant, cultivation is best: If the green cabbage worm, dry poisons—paris green—sprinkled on is the best preventive I know. If the grub worms are located near the roots, it will pay to dig about them and kill the worms. Pinch their heads off.

How can smut best be prevented in oats?

Dr. Jordan.—At Geneva we have found "formalin" a good remedy. We will send a bulletin from Geneva giving full instructions how to use it. Smut is a parasitic disease and is spread by spores that live in various ways, blown about by the winds. Black knot on plums and cherries is spread in the same way.

MISCELLANEOUS.

To what extent does the sale of oleomargarine and butterine affect the price of butter, and is our law effective in New York State?

Mr. Flanders.—The first part of the first question is a "poser." I am inclined to think that the man does not live who can state just the extent of the injury done to the butter business of New York by the oleomargarine traffic. I think, however it is reasonably fair to say that every pound of oleomargarine displaces a pound of butter. There were 79,685,724 lb. of oleomargarine sold in the United States during the last fiscal year. The quantity sold in New York during that year was 222,788 lb. The quantity of oleomargarine sold in the different states in the Union during the last fiscal year is as follows:

Yellow Oleomargarine Sold Contrary to Law in 1899.

	No. dealers.	No. pounds.
Alabama	21	226,053
California	....	74,923
Colorado	95	1,123,537
Connecticut	5	134,255
Delaware	48	40,475
Georgia	61	495,004
Illinois	2,020	18,638,921
Iowa	3	79,922
Kentucky	217	1,490,577
Maine	17	102.274
Maryland	58	1,791,950
Massachusetts	108	2,083,889
Minnesota	30	1,343,865
Missouri	231	3,133,313
Nebraska	73	1,024,985
New Hampshire	19	445,583
New Jersey	296	5,875,975
New York	14	222,788
North Dakota	18	7,710
Ohio	1,005	8,830,969
Oregon	3	41,250
Pennsylvania	717	11,433,341
South Carolina	24	258,159
South Dakota	4	55,432
Tennessee	83	714,640
Utah	....	8,450
Vermont	1	2,990
Virginia	121	1,159,400
Washington	5	63,345
West Virginia	172	1,206,865
Wisconsin	23	714,742
Total	5,492	62,825,582

Oleomargarine Sold in States Where Legal to Color.

	No. dealers.	No. pounds.
Alaska	5	18,080
Arkansas	35	380,389
Arizona	5	78,767
District of Columbia	61	816,848
Florida	82	590,225
Idaho	3	58,224

	No. dealers.	No. pounds.
Indiana	306	3,923,228
Indian Territory	21	152,278
Kansas	186	1,658,544
Louisiana	140	1,043,502
Michigan	109	2,092,521
Mississippi	17	104,622
Montana	....	446,022
Nevada	....	625
New Mexico	12	115,850
North Carolina	9	110,224
Oklahoma	10	117,398
Rhode Island	333	3,594,984
Texas	162	1,518,264
Wyoming	5	39,547
Total	1,501	16,860,142

This shows that the quantity sold in New York was a little more than one-fourth of one per cent. of the quantity sold in the United States. I hardly care to comment on just what is being done in some of the other states to enforce their anti-color oleomargarine laws, but in New York it *is* enforced. Not a pound is made within this State and very little sold. What is sold is done under inducements offered by peripatetic agents. We are, however, catching them and punishing them.

What legislation is needed to stop the sale of oleomargarine entirely?

Mr. Flanders.—The first national legislation that is wanted is a law that will provide against the falsely branding or marking of dairy or food products as to the State or territory in which they are made. This will stop such marking as to interstate commerce goods and then the State itself can take care of internal matters. There should also be an act passed providing that when any dairy or food products are transported from one State into another they shall immediately upon entry become subject to the laws of the State, irrespective of the form or package in which they are done up. This would fix it so that there would be no question about enforcing such laws against the original importers' packages, and then after this legislation, if Congress would raise the tax on colored oleomargarine sufficiently high, so it could not be manufactured and sold for a less price than butter, it would do away with the temptation for people to put it on the market and sell it as butter in States where State laws and State machinery are not sufficient to cope with the evil.

Would it be detrimental to educational interests of our schools to have an hour's agricultural talk each day?

Mr. John W. Spencer.—I would say, most emphatically, it would not be detrimental in the hands of any teacher competent enough to pass examination for a teacher's certificate. Of course, many teachers, by favorable temperament, could bring better results than others. The longer I am in this work, the more impressed I am that agriculture is valuable information to give city children. There are tens of thousands in the tenement district who do not know a dandelion. Teachers write me that when taking them to the park they throw themselves upon the turf and actually kiss it. In some parts of the sweat-shop district of New York not 50 per cent. of the children have been to any of the parks. This I believe to be credible information, having received it from principals who have worked in those districts for a dozen years. Details of rural life, you and I knew at such an early date that we cannot recall when we did not know them, are as interesting and wonderful to city children as though Stanley was relating something that he had seen in darkest Africa.

Resolved, That keeping more sheep, doing more ditching, using less phosphate and selling less raw material, is the only salvation on American farms. What do you say to that?

Mr. Cook.—Amen to that. I am fully convinced that it would be much better for the owners of these rough, hilly farms if they would keep fewer cows and put on some sheep, and I would allow some of the hills to grow another covering of forest trees. As to phosphates, I do not want to say that a man shall not buy them. If I want them I shall buy them; but I do not believe that any man can go into the market and buy mixed fertilizers and get his money back. But I know that I have made a profit from buying the chemicals, taking them home and mixing them myself. I have several tons of South-Carolina rock at home, bought at $11 per ton, and it is worth more now. But first save all the barn manure before buying phosphates; then, if you require more fertility, buy the chemicals, first ascertaining what elements your soils need to grow certain crops. As to draining, I will say that there are but few farms that do not have wet places that yield nothing. If those places can be tile-drained, they may be made the most productive places on the farm, at least for some crops.

In answering the latter part of the question, I will say that I am not in favor of drawing a crop off the farm if I can feed it to farm animals. We aim to feed all we grow, unless, at times, we can sell a crop and buy another equally good for feeding at a less price.

Do you advocate fall plowing?

Mr. Smith.—At the station but little or no fall plowing is done. Conditions will rule, or should. Where land can be plowed early in the spring, I would not fall plow. At the station farm, crimson clover and the vetches are used as a cover crop on most of the cultivated ground.

Shall we apply lime or wood ashes to sour soils?

Mr. Converse.—I don't think it would make much difference. Would use the ashes if I could get them. If not, I would apply the lime at the rate of 30 bushels (slacked) per acre.

What causes dry, gravelly or sandy soils to become sour?

Mr. Converse.—I have heard chemists say that the cause is from removing the humus, so that the plant food in the soil is not made available, and that the decomposing plant food becomes acid.

Does the presence of sorrel in our soils indicate acid?

Mr. Converse.—Not necessarily. Sorrel grows on all soils. Its presence is due, as a rule, to the absence of other plants, and to sterility of the soil. When a soil is well fertilized, cultivated and seeded, sorrel will not crowd out the crop.

Can cow peas be grown here successfully, if sown in the corn at the last cultivation?

Mr. Cook.—I have never sown cow peas, but I would say, no. It would not be safe to sow cow peas so late in the season as that. The frost would come along and cut them down before much growth was made. They should be sown early if a good crop is secured.

Is it advisable to grow one "special" crop on one farm?

Mr. Dawley.—It depends very much on conditions and the man's aptitude to the work. Much also depends on hired help. We can hire men to care for stock, but, when it comes to poultry, we find we cannot do it. It will depend on the aptitude of the individual, and the conditions that surround him, whether he can afford to make a specialty of one crop or not.

Mr. Cook.—I believe that, when a man can make money from one crop, he may safely try another. I have met dairymen who, notwithstanding they violated every dairy law, persisted in making money every year.

What shall I add to a good milk-producing food to fatten a dry cow?

A Farmer.—I would add corn meal.

Mr. Cook.—I know of nothing better, after much experience. If the cow is a dry one, I would add a little wheat bran and feed some ensilage, also.

Dr. Smead.—I think, if the ensilage was rich in corn, if much corn meal were fed bad results would follow.

Mr. Cook.—I would feed more of such foods to a dry cow being fattened than to one giving milk; but I would not feed too much ensilage. We do not want to feed too much concentrated foods, either to a dry cow being fattened or to a cow being milked. Nor would I feed all animals alike.

Prof. Stone.—It would depend upon the condition of the dry cow. If she were thin, I would feed more liberally of carbonaceous foods than I would if she were in fair condition. I do not think it safe to feed too liberally at first of carbonaceous foods.

Mr. Cook.—I think we often make a mistake in feeding our dry cows too liberally of refuse stuffs. The average farmer, if he has a good supply of straw, cornstalks or timothy hay, is inclined to feed too much of such foods. They do not furnish the requisite supply of blood to perfect the offspring, yet unborn. We must, therefore, feed such a cow more protein than we would to one being fattened. It is pretty hard work to formulate a ration for such a purpose because animals differ. But I have never found a ration better for such purpose than corn meal and wheat bran, half and half.

Would it pay to grow corn on good potato ground, where potatoes grew last year?

Mr. Harmon.—Yes. I have never been able to get along without a cornfield, and I think, as a rule, every farmer ought to have a cornfield. There are a good many dollars paid out for western corn every year, which is evidence enough that the farmers are not only feeding it, but that they are not growing it. I think that we ought to grow more of it, also more potatoes and less beans.

Why do not our state institutions buy home-made beef?

Mr. Ward.—I believe that one of the most serious mistakes the farmers of this State made was the giving up of the raising of beef. Last year the county of Genesee paid more than $400,000 for western beef. The State, outside of New York city, paid $30,000,000 for western beef. Now why not raise beef? I am just as willing that my money go to Germany or Cuba for sugar as to Nebraska for beef. If the farmers of this State are to grow beef successfully, they must have beef breeds, with full-blood beef sires. I do not believe there are a half-dozen pure-bred beef sires in Livingston county. We don't want general purpose animals, nor milk breeds, but the pure beef breeds. As prices are to-day, with such beef animals, the raising of beef in this State can be made profitable.

Is a canning factory a benefit to the farmer?

Mr. Cook.—I do not live near one; but, from what I have observed, where they are well managed they have been a blessing to the farmers. By this I mean a factory that is co-operative, not one built by a "canning factory promoter." If your system is that of the "promoter" I would let the thing everlastingly alone; otherwise I would go ahead and establish one, provided the farmers will agree to support it right along, so as to make it permanent.

Why are there so few farmers in the Legislature, each year?

Mr. Hale.—I put that question in the box. We have a farmer present who is also a member of the Legislature—Mr. Litchard. I would like to hear from him on the subject.

Mr. Litchard.—Last year we had but 16 members that were farmers, out of a total number of 150, in the Assembly. Although agriculture is of more importance than is any other industry in the State, it is represented but by few. The fault is with the farmers themselves. They are almost wholly indifferent to their needs. If they had been well posted in legislative and economic matters, they would never have voted for that $9,000,000 canal enlargement, which has never benefited the State to the value of a cent. We had 69 lawyers in the Legislature, many of them representing farmers. It ought not to have been, and would not be, if we would stand together and not underrate ourselves; and there will never be any change for the better until we reform our methods, learn to stand together and work for our own interest, and we must do it at once if we are to accomplish anything. Within the next five years more than one-half of the population of the State will live in the cities, and the representatives from those cities will be professional men, who will control legislation. So we must first agree on a policy and then stand together and enforce our rights.

Mr. Hale.—I agree with Mr. Litchard fully. It is the indifference among the farmers that is the main trouble. We ought to be better represented in the Legislature, but I would tremble if we had a Legislature with a majority of farmers in it.

What position should the farmer assume toward the Erie canal? Shall the work of enlargement be continued?

Mr. Cook.—When we stop and think what the Canadians are doing by way of waterways, a canal across the State is of much importance. Now, how many here are in favor of continuing the canal appropriations? Hands up!

(Not a vote.) How many are in favor of abandoning it? (Half a dozen hands were raised.) How many would turn it over to the general government? (Fifty or more hands were raised.)

What must we do after planting corn, when the crows are so thick that they fairly swarm?

Mr. Squires.—I would put on corn enough for the crows, protect them, and shoot the boys that shot the crows.

Dr. Smead.—That's right; I believe the crow is to-day the farmer's best friend. Wherever we have been where crows are plentiful, the reports are that the forest tree caterpillar is but little known. I believe the crow is worthy of our protection; and there is another little inoffensive animal which gives off an offensive odor, which is being trapped for something for the ladies to wear—which is the skunk. It is claimed that he steals chickens and breaks up hen's nests, but he is another of the farmer's friends. We often hear the inquiry: "What shall we do to kill the white grubs in our soil?" This little animal is the best destroyer of them we have.

What can be done to decrease taxes?

Mr. Cook.—I am tired of this talk of being taxed to death. The town I live in receives from $5,000 to $10,000 more than it pays out every year in State taxes, from the cities and corporations. It is all bosh, this talk about our excessive taxes. There is a much greater taxation levied on wasted manure and rusted out farm implements every year than we are asked to pay in State taxes.

What will be the cost per square foot for cement floors? Would you have the cows stand on the cement floor or on plank?

Mr. Cook.—This cement floor question is an important one, both from a sanitary and financial standpoint; but, owing to prejudice and a want of knowledge, there have been but very few cement floors put in until of late. Further cause was the high price of imported cement; now, however, we can get home-made cement fully as good, if not better than that imported, for one dollar less per barrel, so that, with this decrease in cement price and the increase in the price of lumber, the cement floors will not cost any more than the plank. There are several American brands of cement which are all good. If the foundation is good and water does not get into it, there will be no need of making a grout foundation. All there is of it, is to get a foundation that will not settle. We have cement floors that were laid directly on the earth, which have never settled.

Mr. Cook exhibited a chart on which was a crayon drawing which showed a cement floor and gutter in his stable or rather in the one which he will build this summer and which he fully described, thus making the explanation much better understood. He said he did not believe there would be any trouble with the standing on a cement floor, if, when it is finished, it is floated off with a board instead of being troweled down, as the surface will then be a trifle rough, so that the bedding under the cows will not slip off. If, however, one does not want his cows to stand on the cement, scantling may be imbeded in the cement, across the stalls and when the cement is hard, plank may be put down, but the gutters and the distance between the cows' hind feet and the gutter should be troweled down and be made smooth.

Would you use sawdust in a stable as an absorbent?

Mr. Converse.—Yes, if you can't get anything else; but straw is of much more value, if you can get it. Sawdust, on heavy land, might have a benefit in lightening the soil, however.

How will injurious affects of drouth in a corn and potato crop be best avoided?

Mr. Van Alstyne.—We cannot control the rain fall, but we may conserve the moisture already in the soil by frequent shallow cultivation which breaks up the surface cells in the soil and leaves a dust blanket through which the moisture cannot escape. Such cultivation pumps the moisture from below so that the roots of plants can use it. Keep the cultivator going, but at a shallow depth, not more than two inches at most. This for hoed crops. Of course, it could not be followed on sown crops or grass land. I am acquainted with a man who, by keeping his cultivator going, grew over $400 worth of red raspberries on a small plat last year. Had he not done that his crop would have been a failure.

A Farmer.—Thorough cultivation not only brings fertility from the lower depth of the soil, but has an action on the atmosphere which causes it to return fertility to the soil.

Mr. Van Alstyne.—There has been found a very small per cent. of nitrogen from the air, brought down by the dews and rains, but it is but slight. There can be no mineral matter obtained in this way, since there is none in the air. Potash and phosphoric acid come from other sources. But we may gather nitrogen from the air and return it to the soil through the growing of certain legume crops, such as the clovers, cow peas, field peas and beans. These plants have small modules on their roots, in which the nitrogen is stored, thence transmitted to the soil, but we cannot utilize this nitrogen, the mineral elements in the soil or that which we apply, unless we have moisture to set them free, so that the plants can take them in liquid form. So then, if we do not get the moisture through the rain fall we must get it by surface cultivation, as I before stated.

Which is best, fall or spring plowing for the corn crop?

Mr. Litchard.—Conditions will govern. On my land, I prefer spring to fall plowing.

What crop is the best crop to sow in the fall, to be plowed under the next spring?

Mr. Converse.—I would sow some crop that would add nitrogen and humus, and not at the same time remove fertility. I would not sow buckwheat, or rye, but the clover instead. Crimson clover may be sown as a catch crop in the corn or potatoes and left on the ground as a cover crop to be plowed under in the spring. I should never plow a furrow in the fall unless the soil was a very heavy one so that I could not work it early in the spring.

Should a farmer own a mill of some kind and grind his cattle food at home?

Mr. Cook.—We have a mill run by wind power. It will grind from eight to fifteen bushels per hour, depending on the amount of wind; we are satisfied with it.

Dr. Smead.—A year ago I bought a No. 1 sweep, one-horse power mill. It is ball-bearing and runs easily and will grind from eight to twelve bushels per hour. If I were going to buy another one, however, I would get a No. 2, which will grind from twelve to fifteen bushels per hour. It grinds very finely and costs no more for hired man and horse power to run it than it does to draw grain to and from a mill, while I save the toll. My mill cost me $20.25 delivered at my station; a No. 2 costs just $2 more.

Mr. Cook.—When we had our grain ground at a custom grist mill it cost us $50 per year for toll; that sum we now save.

Will Mr. (T. B.) Terry tell us what kind of soil his is?

Answer.—Ours varies from heavy clay to a loam. But some of it had to be underdrained with tile two rods apart to get out the water, to allow the clover to grow.

How much had a man with a farm income of $1,000 per year, ought to pay a hired man?

Mr. Van Alstyne.—It will all depend on the hired man. Some of them are not worth having about at any price. The best man I ever had I paid $22 a month and his board. Another one received the same price and boarded himself, but was not worth, all times and things considered, much more than half as much.

How is it that plants can live in soil that is dust dry?

Mr. Cook.—They can't do it. But they will live in a soil that has only a dust mulch. The capillaries in the soil are thus broken up and the moisture pumped up from below, which the dust mulch prevents from getting away.

How can we secure free rural mail delivery?

Answer.—You will have to tackle your congressman. He seems willing to do all he can for Oswego county. So far, free mail delivery in the rural districts has given much satisfaction. It is not a new, but an old thing. But some of the fourth-class postmasters are opposing it because it is closing up some of their offices. But there is one great drawback—which is the bad roads. If we are to get rural free mail delivery, our roads will have to be made better than they are now.

Dr. Smead.—Wherever it has been demanded, as a rule, it has been granted. The chief opposition comes from the rural districts. The merchants and other tradesmen in the villages seem to have an idea that free-mail delivery will injure their business. Then there are some farmers who want to go to town, sit on nail kegs and talk politics.

Mr. Litchard.—I think that free rural delivery of the mails is in the near future, and sure to come. Changes are all the time taking place, but they come slowly. Our country school districts are in many places, being abolished, and the children all gathered into one schoolhouse in some central point; and I incline to the belief that the time is not far distant when the entire system in the rural districts will be changed.

Will the horseless carriage injure the market for horses or the bicycle?

Mr. Ward.—I ride a wheel, but I go round by a back street to avoid the rabble who ride wheels on the main streets, and I believe the day of the wheel has gone. Nor do I believe that the automobile will ever cut much of a figure, much less displace the horse. They are a fad; besides, they cost too much and can be afforded only by the wealthy. No, the horseless carriage and the wheel are not in it with the horse, on the street or road, nor ever will be.

Is black muck good material for humus?

Mr. Van Alstyne.—There is some humus in muck, which will hold moisture. It is most beneficial on sandy soils. There is not much plant food, however, in muck.

Please give a sure but cheap remedy to get rid of orange hawk weed. People do not realize the danger from this beautiful weed.

Mr. Van Alstyne.—That weed is known in some localities as "Devil's Paint Brush," and, when allowed to grow undisturbed, will drive out nearly all other plants as well as the grasses. Where ground can be plowed and cropped, it may be eradicated by cultivation. A succession of crops will do it. But, where it has a foothold in pasture or land that cannot be plowed, I do not know of any remedy unless one resorts to the work of pulling it out. Mowing it does not seem to be effectual.

[See last year's annual report for article on orange hawk weed. —DIRECTOR.]

How shall we get rid of wild mustard?

Mr. Cook.—There is no patent right way to get rid of any of these noxious weeds, cultivation is the best way I know of. The department of agriculture at Washington sent out a bulletin giving directions how to get rid of these weeds, but, if anyone knows how fully to do it, I should be glad to know of it. Except it is done by a rotation of crops and good cultivation, mustard seed will grow after years of imprisonment in the soil even on an old pasture, when it is plowed. The great trouble has come from sowing grain impregnated with the seed. We ought to free all our grain from these foul seeds. If we will only be careful in that direction, we may easily prevent much of this trouble. But, with wild mustard I do not think that a rotation of crops will help much.

How can we get rid of kale?

A Farmer.—Pulling it out is the best way I know of.

Mr. Cook.—Thorough cultivation will do it, but the trouble is with the seed which will lay dormant in the soil during many years; but when given a chance will grow. The best remedy to prevent it from going to seed is to pull it out. It is an annual and does not make another crop, except from seed.

How can one prevent live-forever from growing?

Mr. Cook.—I don't know, except cultivation and rotation is followed. In Delaware county it was reported two or three years since that a parasite had appeared there which had attacked the live-forever and was killing it. I don't know anything about the truth of the statement.

How are we to get rid of plantain both on new and old seeding?

Mr. Litchard.—If the land is kept seeded all the time, I do not know what you would do with it.

Mr. Converse.—I see no other way except to give a rotation of crops. A three years' rotation and good cultivation will drive it out. I would not mow a meadow more than once. Plantain, wild carrot, rag weed and others may thus be eradicated by a rotation of crops and good cultivation.

Mr. Cook.—That is good advice; but there is a whole lot of land we cannot cultivate. On such land we can do little else but pasture.

How can we get rid of burdocks in our village streets?

Mr. Cook.—Call the trustees together and lay the matter before them. It ought to be their affair.

W. S. Moore.—Keep picking off the leaves and feed them to horses. They are very valuable for that purpose and are greatly relished by the horse.

Will the feeding off the green wheat in the fall produce chess as is claimed by some people?

A Farmer.—I think it will. I once knew a field of several acres of winter wheat which was fed down by a lot of calves at harvest time, one-half of the field was chess.

Mr. Ward.—Whatsoever a man soeth, that shall he also reap. There is a standing offer of $500 to any man who will bring a stalk and root on which wheat and chess are both growing. That is an old exploded notion.

Would you advise the using of a horse-rake after a harvester?

A Farmer.—What does that mean? If there is anything to rake, rake it. Ordinary rake teeth will not injure the ground or the seeding.

What would you plant on a field that has not had any manure, but has been growing wheat 50 years?

Mr. Hammond.—I would plow it, sow rye, plow it under, sow another crop, and plow that under. What is wanted is vegetable mold in such a soil; then we can fertilize.

A Farmer.—We need humus just as we need water.

Mr. Cook.—I am glad that I have struck one place where they ask for water.

Why does sorrel grow on some lands and not on others?

Mr. Hamilton.—Because the soil is barren, and other plants have been crowded out. Enrich and cultivate the soil, and sorrel won't grow on it. Its presence simply shows the absence of other plants.

How should bees be handled?

Mr. Faulkner.—Some men would put on gloves, and some would wear a veil. The time is not long enough here to go into a full description as to how to handle bees; but I will say that there are thousands and thousands of tons of honey going to waste every year for the want of bees to gather it. The bee not only furnishes one of the best of sweets, but it fertilizes blossoms that are barren, thus making them fruitful.

What will it cost to have samples of our soil analyzed?

Mr. Dawley.—Twenty-five dollars. But when you get it done, you will know no more about it than you did before. The chemists can tell how much potash or other plant food there is in a sample of soil, but as yet, they know of no way to tell whether or not it is available for the use of the plant. So why should we ask the chemist to analyze any of our soils.

To Mr. Terry.—Would you advise every one to pursue the same rotation of crops you do?

Answer.—Certainly not. Circumstances differ. Then, if everybody grew clover and wheat, we would soon have a surplus. But you might grow clover, corn, wheat and potatoes. I know of men who practice such a four-year rotation.

Would corn take the place of potatoes in a clover rotation?

Mr. Terry.—Yes, nicely. I have friends who grow clover, corn, potatoes and wheat. Perhaps it is safer to make a four than a three-year rotation. We cannot afford to grow oats alone, but we grow oats and peas to feed, as a hay crop, cut just as the peas are filling. We do not grow oats alone, for the reason that it takes so much water to grow them, which is about 700 pounds for one pound of oats. It is this great drain of moisture that causes a small crop of oats in a dry season; not poor land.

Is Mr. T. B. Terry's rotation wrong? By substituting beans for potatoes, would it pay a farmer better than the one recommended by Mr. Converse?

Mr. Converse.—It will depend on the man and his conditions. Every man must answer for himself. With us the rotation I gave this morning is best. That was clover, corn or potatoes, oats and peas.

What does it cost to drain, with best tile, per acre?

Mr. Terry.—That will depend on the cost of making the drains, and that of the tile. It ought not to cost more than $25 per acre. On flat land one should have large tile, say four to five inches, which cost more than do the smaller tiles. We have some drains made by hand that cost $30 per acre; but where the drains can be made by horse-power and smaller tiles are used, the expense ought not to be more than $25 per acre.

How does Mr. Terry prepare his ground for wheat, after potatoes?

Answer.—We plow deeply, then use the cutaway harrow to fine the ground. It cuts up and quite thoroughly fines the vines from an early crop; for later varieties we rake up the vines draw off and spread them on our clover sod to be plowed under the next spring.

To Mr. Terry.—What soil is best adapted to phosphates?

Answer.—Phosphoric acid—which, I suppose is what is meant by the question—has best effect on a heavy clay soil. On sandy soils it does not seem to prove of much value.

Which is cheaper for drains, tiles or stones, if one has the stones and wants to dispose of them?

Mr. Ward.—I have had some experience with stone drains, and I am of opinion that, all things considered, the tiles are the cheaper in the end. I know of tile drains laid when I was a boy, that are now in good condition,while some stone drains laid later, are all stopped up and worthless.

Which is best for underdraining, tile or timber, and if timber is used, how should it be constructed to obtain the best results?

Mr. Van Alstyne.—If there is plenty of water, hemlock may be used, as it will last a long time, but will dry-rot quickly if in dry soil. Tiles, however, are always good, and, as a rule, all things considered, will last longer than will a timber or board drain. Round tiles are best.

Would seeding in July do as well as in May?

Mr. Van Dreser.—It would depend on the season. As a rule, oats take out too much moisture, especially from clover. July seeding in the corn has given quite good results, so has that sown in August.

What soil is best adapted for growing cabbage?

Mr. Van Wagenen.—A strong, easily worked loam.

How best to drive away the house rat?

Dr. Smead.—At one time my premises suddenly became over run with rats. Upon inquiry I learned that a neighbor who had rats procured the services of a ferret which drove the rats over to my house. I secured the services of a ferret, which drove the rats all away. I don't know where they went. My opinion is, that a ferret, well trained, is about as serviceable as any remedy to dispose of rats.

Are the humming birds of benefit to the farmer or horticulturist in any way?

Prof. Stewart.—I don't know. Have never observed or made inquiry; but I have heard it said that the humming birds were very serviceable for the reason that they conveyed pollen from one blossom to another, thus fertilizing the barren ones.

I desire to raise celery, but have had no experience. I want to grow the plants and to know what kind of soil is best suited.

Mr. Chapman.—I grow a little celery every year. It requires rich ground; that which is a little moist is best. We sow the seed in boxes early, to give the plants a "good start." This is about the season to sow the seed. I make a trench with a plow and set the plants about six inches below the surface and four inches apart.

Mr. Converse.—Celery does best on a black, rich moist soil. Muck is the best.

After winter wheat, should the land be plowed for crimson clover, or will it do to harrow it, and, if plowed, should the ground be rolled? How much seed per acre?

Mr. Converse.—Yes, sir. Fit the ground finely. Sow six to eight pounds per acre, roll down the land hard, then stir the surface with a Breed weeder. If the clover is to follow oats, use the harrow instead of the plow.

I should like to know about the cultivation of asparagus. Would it be expensive to start a bed for profit? How far apart should the rows be made?

Mr. Abel Stevens.—Everyone who owns a bit of land should have an asparagus bed. Prepare the land by working it deeply and sow your seed next spring. The spring following, having thinned the plants and top-dressed them with good manure during the first year, transplant them. Set the plants two feet apart and the rows four feet. Have the soil at least two feet deep, well fined, with ten inches of good barn manure in the bottom. Cover the roots with at least four inches of well-fertilized earth. As soon as the berries show cut out the plants bearing them. Cultivate often, and cut but few times the first year, and fertilize well with potash. Wood ashes or muriate will furnish the potash. If one wants but 100 plants he may buy them and thus save one year's time. But do not buy roots more than one year old.

What will prevent "club-foot" in cabbage?

Mr. Van Alstyne.—The best thing I know is not to set cabbage on ground where club-foot grew? I know of no cure for it where once it appears in the crop. It is said that it were better to plant the seed where the cabbages are to grow and not to apply hog manure. The turnip, cauliflower and other members of the cabbage family, when conditions are favorable, are attacked by the disease.

Dr. Smead.—Avoid heavy feeding with barn manure for either of those crops.

Mr. Van Alstyne.—Heavy feeding with commercial fertilizers will not have a tendency to cause the disease, because there is nothing in them to contain the disease germ.

How deeply would you plow a clover sod in the spring, for corn?

Mr. Litchard.—That would depend on the character of the soil. I would not plow a heavy soil as deeply as I would a dry, light one. Mine is a light, chestnut and oak soil, and we plow it about seven inches deep for corn, the same depth for potatoes.

What is the best all-round farm fence?

Mr. Eastman.—Not any; I don't believe in fences, except on particular occasions. Sometimes we find it necessary to fence in a new field, then I use wire.

Mr. Litchard.—The best fence I know of is barbed wire; the last work I did at home last summer, was to build 66 rods of barbed wire fence. Its use is increasing every year, although we hear of some severe accidents to cattle and horses from it, but it is the best material for all that. The old rails in our county are going, while lumber costs too much to be used for fencing.

A Farmer.—Barb-wire fencing should be prohibited by law.

Mr. Cook.—I can count now fully a half dozen horses that were injured last summer by barbed wire; as a rule, it was done by the colt fighting flies when standing near the fence; in striking with his foot it was thrust between the wires that were close together, which cut the foot about the fetlock; one of the colts was permanently injured; I prefer the Page woven wire fence to any I know of.

Should the Grange elect farmers only for its officers?

Mr. Cook.—I think so, for the reason that the membership is mostly made up of farmers. We have a Grange in our town of 200 members, and another of 100 or more, and we have found that we prospered best when we elected farmers to office. If you have a barber, merchant or a man of some other profession in the Grange, keep him out of the master's chair. I know of two or three Granges which have stranded and gone to pieces because they violated certain fixed and essenial rules. If you have a man in your chair who will not live up to these rules, ask him to get out; if he does not do it, turn him out.

How about cow peas as a soil renovator when plowed under?

Mr. Terry.—Cow peas will, in part, do the work of clover, but I should not advise substituting them for it, especially in this climate, although they will grow on poor land better than will clover. I have seen five times as much growth from them on the same land and they will furnish a great amount of humus; but I prefer clover.

What class of reading is best for the average farmer?

Mr. Converse.—The Cornell reading course furnishes good literature. I have taken that course. It pays. Any one, whatever department of farming he may be engaged in, should read farm literature suited to his business. I heard Prof. Bailey, of Cornell, say recently that there are now about 16,000 farmers in the State taking the reading course. Take it and also the bulletins from Geneva and Cornell. You will find them of great value.

Should not agriculture be blended with education?

Mr. John McManus.—I don't know that I am fully competent to answer that question. As a rule the boy who attends the district school gets some agricultural schooling at home before and after he goes to school. But I do not think it necessary to make agriculture a special study except in a casual way, in the district schools. The regular agricultural colleges and schools will furnish the farmer boys with the requisite schooling in that direction. Besides, I fear the district schools would put the study before the student so as to make it distasteful to him.

Dr. Smead.—I am convinced that the demand for agricultural study in the districts is growing, and that the time is not far distant when it will be introduced therein.

Why not seed on the sod and not plow so much?

Mr. Van Wagenen.—I do not know just what is meant by the question.

The Writer.—Why not seed with the first crop?

Mr. Van Wagenen.—As a rule, with us, when sod has been broken, it is not thoroughly enough broken up to seed it at the first plowing.

In fall plowing on clay soils, does it pay to plow more deeply, land which has been previously ploughed?

Mr. Van Wagenen.—That question cannot be answered categorically for the reason that soils differ; one may be plowed quite deeply while another may not.

Will Mr. Cook describe his disc harrow?

Answer.—A disc harrow is one with round disc-shaped wheels with sharp edges; wheels 14 to 16 inches in diameter. Have it heavy enough to be drawn by three or four horses, then weight it with 300 pounds of stone and a driver.

How shall we keep the boys on the farm; and why do girls dislike to marry farmers? I had no difficulty in finding a wife.

Mr. Van Dreser.—I know of one who seemed glad to get me, and they are marrying farmers every day.

If the boy on the farm will put intelligence and dignity into his work, and make his home such as it should be, there will be no trouble in coaxing a girl to marry him. Years ago when I went into Cobleskill I was jeered at and called a pumpkin-head, clod-hopper, hay-seed and other names of like character; and some boys are greeted that way now, but not many of them. Yesterday I had the privilege of talking with a number of members of the legislature who are farmers, and the number is increasing there every year. But, if a boy has not a taste for farming he ought not to be forced to stay on the farm. Such a boy will find some other occupation more to his liking. Allow him to follow it. There are many boys who are driven from the farm because all their surroundings are made distasteful, and because they are improperly educated. Give the boy who is to stay on the farm, an education to fit him for his calling: then make the home surroundings so pleasant that he will not want to go away. I know of no better way to keep the boy, fitted to be a farmer, on the farm.

Do you advise farmers to plant or sow cow peas? If yes, why? Have you succeeded in growing them in this State?

Mr. Cook.—Cow peas do not succeed where I live (Lewis county). It is not a pea, but a bean, and is a tender plant. I have not seen a man in this State who has succeeded in growing them. In New Jersey they are sown and mature perfectly.

At what season of the year should fence posts be cut?

Mr. Van Alstyne.—Cut them when the growth ceases; and I would set the large end down. But do not cut the posts when the sap is passing either up or down.

What price ought a patron to pay for making his butter at a creamery?

Mr. Van Alstyne.—I make some butter for my neighbors, taking three cents per pound for doing it. It is the usual price for making butter, but the owner must market it; three and one-half cents seems to be the usual price when the creamery both makes and sells. It costs me just as much for making their butter as if I sold it somewhere else. Deduct that price per pound for the price it is sold for.

Do you know anything of the value of "Speltz" as a forage crop, highly recommended by a seed dealer?

Mr. Smith.—I know nothing of it, except that, as a rule, all these new-fangled things are no good. Go slow; don't invest your money in them. It would be much better to fit a piece of land well and then sow alfalfa. It is one of the best forage crops one can raise.

What will keep cider all winter, from working?

Mr. Litchard.—It is said that a good prohibitionist can keep it by putting in a little "sassafras;" I don't know how much, however.

Mr. Cook.—Heat it up to 130 or 140 degrees, strain it, add a few raisins, then put it into clean bottles and stop them tightly; in that way I am told it keeps very nicely.

What is practical farming?

Mr. William Eastman.—A farming that will pay in dollars and cents; nothing short.

Mr. Cook.—What might bring success to one farmer might not to another, and I think we ought to consider something else beside dollars and cents. But it has been my observation that the man who looks after little things and economizes, does best. It is a question of individuality and moral honesty more than any other.

On what crops is a weeder adapted? Can they be used on sugar beets and strawberries?

A Farmer.—On any common crop.

Mr. Chapman.—I have used the weeder on strawberries and raspberries, and I know of a man who used it on three acres of sugar beets last year that produced twelve tons to the acre, but he ran it across the rows.

Mr. Converse.—It is one of the best tools on the farm. We use it on peas and oats for the purpose of conserving moisture. It may be used successfully on quite stony ground.

Do you prefer cement mangers for cow stables?

Mr. Cook.—I have not had any experience yet with cement mangers. We will build a barn next year which I will describe. It will have cement floors and gutters, at least, and possibly we may put in cement mangers.

Does it pay the farmer to keep his buildings insured?

Mr. Cook.—I think it does. I keep mine insured. All good business men keep their property and lives insured. Then why should not the farmer keep his property insured? Surely he is a business man, or ought to be.

How should seed corn be selected and cared for?

Mr. Litchard.—I think the best way is to go into the field and select the best ears when glazed, then care for properly and have it well cured out. In that way good seed may be secured.

Mr. Chapman.—It has been decided in Michigan that seed corn ought not to be allowed to freeze, as it destroys the vitality of the kernel.

A farm has 60 acres of meadow, 35 of pasture and 5 acres of wood: Which will pay best, to set more forest trees or cultivate the land?

Mr. Van Alstyne.—My opinion is that it would be better to allow such a field to grow up to timber. There is going to be a scarcity of timber, very soon. In the near future it will be very valuable, and, if one has such a farm as is named in the question, I believe that the best use to put some of it to, would be to allow nature to cover it with a new forest.

Would Mr. Hardy advise a college education for a farmer's boy?

Answer.—I do not think the farmers' or any other boys can have too much education.

When putting on a steel roof, should the old shingles be removed?

Mr. Cook.—I would most certainly remove all the old shingles and the nails, and relay the roof boards, placing them edge to edge.

Would it be advisable to use either cow or horse manure on land for Hubbard squash?

Mr. Ward.—Make a deep, large hill, putting a good supply of well-rotted cow manure in the bottom; round up the hill slightly and plant.

Mr. Converse.—I do not believe we can get as good results from hilling any crop. We can cultivate more easily, conserve more moisture, get better growth and a better yield, by giving level culture than by hilling. So I would give squash level culture.

Would it injure corn if one turnip is allowed to grow in a hill?

Mr. Smith.—I do not think it would make much difference with the corn; but I would not plant the turnip seed in the corn hill. I would wait till the last cultivation of the corn, say the 1st of July, then sow the turnip seed between the rows and cultivate it in.

How can we best improve the condition of our country roads?

Mr. Cook.—In our town we raised $1,500 for the purpose of benefiting our roads, and bought a stone crusher. But the man who runs the crusher must be a careful one whom the people will trust. It took us three months to work up a sentiment sufficient to get the appropriation, but we succeeded, and now hope to have better roads.

What sum can a non-resident farmer afford to pay a manager to look after his farm?

Mr. Cook.—Who knows? I don't. There are too many conditions involved in the question.

Mr. Rice.—I don't know how we can get at it. It would depend on the man, the size of his farm and the capacity of his pocket book.

Mr. Van Dreser.—You can't pay a manager too much if you have business enough to keep him at work.

A Farmer.—We don't need a manager. It is all we can do to manage the farms ourselves.

Mr. Cook.—There are a whole lot of fellows up in our county who need managers, but they don't know it. As a rule, however, a good wife is the best manager on a farm.

Is it best for one to follow mixed farming or should one devote his efforts to more than one branch?

Mr. Terry.—As a rule, however, when a man attempts to do a little of everything he does but little, and realizes but little. But, if I were making dairying a specialty, I would follow it. We are working out of potato-growing, and turned our attention more to dairying, for the reason that potatoes do not prove as profitable as they did a few years since.

What is the best way to have maple sugar, white?

Mr. Cook.—Keep everything clean. I have seen just as white sugar made in the old kettles as by the best recent methods.

Mr. Litchard.—That will do it. Keep out all foreign matter and be careful in finishing the product not to scorch it.

What are the greatest leaks in farming?

Mr. Van Alstyne.—I don't know. There are a good many of them. Probably the waste of manure is the greatest loss, the next is the loss in farm machinery and tools left out of doors to rust out and rot.

Dr. Smead.—There is another great loss which is in the improper feeding of our farm animals. Hundreds of thousands of dollars are lost each year in feeding unbalanced rations, often resulting in disease and death.

I do not hesitate to say that fully 60 per cent. of the cases I have been called upon to treat, in my profession as veterinary surgeon, during the last 30 years, has been caused wholly from the feeding of unbalanced rations. They over-stimulate the animal's stomach one way and starve it another. Result: Indigestion, followed by some one of the diseases the animal is heir to; still the farmers keep right along, year after year, feeding only that which they have or can purchase most cheaply, despite all the warning and advice they are receiving from the institutes, agricultural stations and the press.

Is a cement floor for cows desirable in a stable?

Mr. Terry.—Yes, but I would not give much, if any, slope to such a floor, and I would have the cement of best quality as well as the sand; and have it well mixed; then the surface made just a little rough to prevent the cows from slipping while standing on it.

How does Mr. Gould fertilize his land when he follows corn with corn?

Answer.—I saw a man plowing under a crop of volunteer oats, self-sown, to-day; the crop covered the ground; if those were mine I would leave them where they are for a cover crop. If I follow corn with corn I always follow corn with a catch crop to cover the ground in winter, which is plowed under in the spring. When I came from home, peas I sowed in September were in blossom, but I don't expect any green peas from them.

Is there any preventive of smut on sweet corn, if so, what is it?

Dr. Jordan.—I know of none.

Would it be profitable to grow tobacco on a hilly farm?

A Farmer.—I am growing tobacco in a limited way on a hillside farm, and I should like to have the experience of others on like farms. Of course it requires a good deal of manure; about all I make, so that the remainder of the farm does not get much, but I can take $100 per acre from the crop.

Two or three other farmers said they grew tobacco and could buy manure for $1 per load, and that 25 loads would manure an acre well and leave a good profit. Another farmer said he preferred to use his manure on his corn crop. It is king with him.

Mr. Cook.—If you can get $100 per acre from tobacco why not buy commercial fertilizers? Buy sulphate of potash, nitrate of soda and South-Carolina rock. I should think it would pay. Would not buy the muriate, as it is said to injure the burning quality of the tobacco.

Would it be advisable to plow wheat straw under for a cover crop?

Mr. Converse.—I should use the straw in the stables for bedding, drawing it out every day and spreading it on land I wanted to plow in the spring. What I meant by a " cover crop," is some green one, sowed in the fall, such as clover or rye, to be plowed under the next spring.

Does the sun blast buckwheat? How much seed shall we sow per acre?

Mr. Cook.—As a rule, buckwheat does not " fill " in a hot, dry season, I suppose, because the pollination is not perfect. We usually sow about half a bushel of seed per acre. One great trouble in getting a crop of buckwheat is too much seed is sown.

Do you advocate the use of the smoothing harrow and weeder?

Mr. Converse.—Yes; we use both. The smoothing harrow has teeth standing backward at an angle of 45 degrees. We use it on corn and potatoes before the plants appear. Later we use the weeder. The object is to kill the weeds before they are born, and to conserve moisture. We also use it on oats and peas until they are quite high.

What is the best way to grow tomatoes?

Dr. Smead.—I wish I knew, but I don't.

Mr. Cook.—I used to train them on a trellis, but it is too much work. So I set the plants in rows, mulch them with straw, prune off the lower side branches, and let them go.

Is there an age limit in the use of a sire?

Mr. Van Dreser.—Mr. Hilton of New Scotland, had a Devon bull that was 22 years old, which was constitutionally strong and a good " getter." And I have awarded a prize at a fair to a Thoroughbred Guernsey cow that had dropped twin calves at the age of 23 years.

At what season should mangel-wurzel seed be sown?

Mr. Cook.—About the 10th of May, I think, is the best season in which to sow mangels. As a rule, all the beet family should be sown early in the spring. They thus get the benefit of the early spring rains while they are not injured by late spring frosts.

What is the best cover crop for St. Lawrence county?

Mr. Cook.—Perhaps the best cover crop here would be winter rye; but I do not believe any such crop is needed here, as, in nine years out of ten, the ground is covered with snow during the winter.

Would you plow corn stubble for an oat crop?

Mr. Ward.—Yes. We are going to plow corn stubble this spring for oats. I think it is the best place to grow them.

Mr. Hamilton.—I don't agree with you. I would not grow oats at all. They don't pay me.

What is the effect when leaving our plowed ground naked from September to May?

A Farmer.—We never have had a chance to try it in St. Lawrence county. As a rule the ground is covered with snow during that time.

Mr. Converse.—I would not plow in the fall, except as a matter of economy when I had a piece of ground that I could not get on to early in the spring. It is better to have some cover crop on the ground than to have it naked in winter.

How can a poor chestnut soil be quickly and economically made productive?

Mr. Terry.—I think I would begin by plowing under cow peas or clover to furnish vegetable matter. Humus, as a rule, is deficient in poor soils, and I think that cow peas are best. Mr. Gould says he sows five pecks per acre, and sows them as soon as all danger of frost is past in the spring.

What variety of carrots are best for the city market? Should they be large, small or medium varieties?

Mr. Cook.—Small or medium varieties sell best. We grow some of the yellow carrots in our garden. I think they are Ox Heart. Long and Short Orange are the best varieties. We do not grow them for feeding to stock; only for family use. We cook them so that they are fully equal to parsnips.

Is beardless barley as good as the bearded variety?

A Farmer.—Fully equal to it. I have grown it three seasons, shall keep on growing it.

Another Farmer.—I have sown it several seasons. Last year I harvested thirty-two bushels per acre.

What is the best method of improving worn out land?

Prof. Cavanaugh.—That is a hard question to answer. Probably the ideal method of restoring fertility to a worn out soil is by plowing under clover. The clover plant has the power of storing nitrogen from the air through nodules or warts on its roots. Follow with barn manure. If you do not have enough, use commercial fertilizers, first ascertaining what elements of plant food the soil most requires for the crops you intend growing.

Will timothy seed that has been hulled, grow as well as that which has not?

Mr. Cook.—I prefer to have it with the hull on; but if the conditions are all right, the hulled seed will grow just as well. By "good condition" is meant a fine, well prepared soil.

What will prevent rust or smut on wheat or oats?

Mr. Converse.—I have heard Prof. Beach say that it can be prevented by soaking the seed grain in water heated to 120 degrees. I believe two hours.

Are artichokes as valuable for swine and cattle as the seedmen recommend them?

Mr. Smith.—I do not believe I would try artichokes. They are no more valuable than potatoes for a swine or cattle food; at the same time, when they once get into the soil it will be found very hard work to get rid of them. You don't want to believe all the stories the seedmen tell.

Would it be advisable to try cow peas as a soil renovator? If so, what variety is the best?

Mr. Smith.—The cow peas are a soil renovator; that is, they are a nitrogen gatherer. There are several varieties; one known as "Whippoorwill," another as "Little Black" are best. It might be well enough to try a few by way of experiment.

Are we now receiving benefits under the pure cattle food act; and upon whom devolves the responsibility of enforcing the law?

Mr. Ward.—I have a copy of the law and will bring it to the next session. The farmers are protected by it, provided they will help enforce it. They must demand an analysis of the prepared ground stuffs they buy. The law makes it obligatory on the part of the dealers to furnish such analysis, and the matter of analysis and enforcement of the law is left to the State experiment station. If the law is enforced and the farmer will find out what feeding values are, they will save hundreds of thousand of dollars every year. There is a firm in Kentucky that is grinding pure corn cob so finely that it cannot be detected except by analysis. This stuff is perfectly worthless as a food, but it is mixed and sold in wheat brans, and there are other mixtures fully as fraudulent.

Explain the difference between in-breeding and line-breeding?

Mr. Cook.—In-breeding is the breeding of sire to daughter; line breeding is the keeping of families of certain breeds together, without in-breeding.

How may I treat a clay soil that heaves very badly, to make permanent pasture or meadow, without underdraining it. Cannot afford to buy tiles?

Mr. Cook.—That is a problem. I don't know as I can answer fully. Possibly surface drains may be opened, so that the water will run off. But if water stands in the subsoil I do not believe that anything can be done with it till that water is out.

A Farmer.—I would suggest putting one blind ditch through that land as an experiment. Possibly such ditches will help it.

Does model farming pay in Allegany county?

Mr. Cook.—I don't know why "model farming" will not pay just as well in Allegany county as elsewhere. It certainly does pay in other counties, and judging from appearances in some localities, it does in Allegany county.

Does it pay the farmers to keep up good line fences?

Mr. Cook.—Line fences are necessary, so are other fences in some instances, but the old rail fences, whether on a line or somewhere else, are nuisances. It were better to take them down, dig out the bushes, plow the land, crop it a year or two, then build a wire fence. The old rail fence is a back number.

I have plenty of stone, and wish to underdrain a piece of wet land. Shall I use the stone or tile?

Mr. Ward I should put the stone into a wall and use tiles. It costs just as much to much the ditch for one as for the other, and just as much to cover it. Tile will last many years, while a stone drain will fail in a few years. I do not believe that any man can lay any quality or variety of stone in a ditch that will last very long. They soon clog up, and often rats get into them and make mischief. I know tile drains that I helped to lay when I was a boy, that are just as good as when laid. Ordinary drain tile may be bought cheaply and will last, when well laid, four generations; but do not make the mistake of getting too small tiles. Have them large enough. The depth to lay them will depend on the grade and the soil. We have laid them only twelve inches below the surface; but, as a rule, the tiles ought to be laid below the frost line. The distance apart will also depend on the condition of the land. The more water there is present, the closer should the ditches be; and, if very wet, it will be best to lay the tiles on boards.

Would you seed after winter wheat or some spring crop?

Mr. Ward.—Ninety-nine one-hundredths of our seeding is done on winter wheat in the spring.

How can hill lands be made remunerative to the farmer?

Mr. Cook.—What is the matter with allowing them to grow up with timber? Sheep and cows might be pastured on them.

A Farmer.—Some of them would not keep a woodchuck alive.

Mr. Cook.—Then allow the timber to grow if the land is as barren as that. But there are a great many acres of land in this State that are reported as barren, which analysis show to be full of fertility. The only trouble is, the fertility in them is not available. Cultivation and humus, when the land can be cultivated, will make this plant food available. When the lands cannot be plowed, the keeping of live-stock, with perhaps the addition of some potash, to give the grasses a start, will render the land productive.

Will clover and timothy "do well" if the seed bed is well prepared and the seed sown after harvesting wheat?

Mr. Cook.—Such a practice is being followed in some localities, and I have heard it recommended, but, to succeed, the ground must be well fitted and the seed sown as early as the first of August. If so done, it will have all the benefit of the land, as well as of the late summer and fall rains to give it a good start, and will establish it to withstand the winter and the spring variation of temperature.

Which will pay best, to cut hemlock into lumber or shingles?

Mr. Moulton.—Cut it into lumber. Hemlock makes a poor shingle; besides, they do not bring a big enough price as compared with hemlock lumber. It is much more economical to buy cedar shingles at the prices they are sold for now.

Will it pay the average farmer to take and read the experiment station bulletins?

Mr. Cook.—There are 350,000 farmers in the State of New York, but there are less than 40,000 of them who take the bulletins from Cornell and Geneva. One would think that the Grangers would take and read these bulletins, but it seems that they do not. There are 60,000 Grangers in the State, so that if all who do take them are Grangers — but they are not — only two-thirds take them. Those who do, we always meet at the institute; and there are some others who attend; but, as a rule, the farmers who ought to attend, and who are in need of help and instruction, stay at home, or go elsewhere. The institutes are held for the benefit of these men, as well as for those who are here. Much information may be derived from the bulletins and the reading course sent out from Cornell University, neither of which cost anything. A postal card, on one side of which is written your name and address, if addressed to Prof. I. P. Roberts, Ithaca, or the Geneva Experiment Station, will bring you the bulletins from both experiment stations, as well as the reading course from Cornell—and all are free. But it is difficult to reach a man who has lived and worked just as his father and grandfather did. It is the same with the 16-year-old boy who is climbing "fool hill." He thinks he knows it all and there is nothing to be learned. You cannot teach either of them. The boy, by and by, will see the error of his ways, but the old, hide-bound farmer, never, except, perhaps, after watching his progressive neighbor, he adopts some of his methods.

A Farmer.—Only about one-half the Grangers and heads of families.

Will you please explain what is known as the "Cornell Reading Course," how is it carried on, how is it paid for, how one is to avail himself of its privileges, and what the cost, if any, is?

Mr. Smith.—The reading course at Cornell is carried on under the provisions of what is known as the "Nixon bill." By corresponding with the department of agriculture at Cornell one may get all needful information.

Mr. Rice.—In this reading course one may get all the agricultural fundamentals necessary. Besides, all high-grade terms are eliminated, and those which almost anyone will understand are substituted.

A Farmer.—I have been taking this course a year and have never found anything more instructive.

Mr. Smith.—How many of you have taken or are taking the course?

A half dozen hands went up.

Mr. Converse.—I think, Mr. Smith, that there are about 16,000 farmers now in this State who are taking the course.

Mr. Smith.—We shall be pleased to see the hands of those who wish to take the course. Mr. Windecker will take and forward the names.

Will Dr. Van Slyke please tell us how oleomargarine is made; also the difference between that and butterine?

Answer.—In the manufacture of oleomargarine, as commonly practiced, the fat is removed from the cattle in the process of slaughter, and, after thorough washing, is placed in a bath of clean, cold water surrounded with ice; where it is allowed to remain until all animal heat has been removed. It is then cut into small pieces by machinery, then cooked at a temperature of about 150 degrees F., until the fat separates in liquid form from the tissue. It is then allowed to settle until it becomes perfectly clear, after which it is drawn into the draining vats, where it is allowed to stand about twenty-four hours, when it is ready for putting in the presses. The process of pressing separates the stearin in solid condition from the remaining product, which is a liquid oil, commonly known as oleo oil. This oleo oil is then churned with cream or milk, or with both, and is salted and treated the same as is finished butter. The product is known as oleomargarine. In making butterine, neutral lard, made from selected leaf lard, is commonly used; but, in this case, no stearin is removed. This neutral lard is kept in salt brine during two or three days, at freezing temperature. It is then mixed with some oleo oil and butter, and churned with cream or milk.

PART III.

PROCEEDINGS

OF THE

INSTITUTE AND TWENTY-THIRD ANNUAL MEETING

OF THE

New York State Dairymen's Association

AT

CORTLAND, DECEMBER 13-15, 1899.

List of Officers New York State Dairymen's Association, 1900.

President.

GEORGE A. SMITH	Frankfort, Herkimer County.

Vice-President.

Prof. H. H. WING	Ithaca, Tompkins County.

Secretary.

W. W. HALL	Gouverneur, St. Lawrence County.

Treasurer.

F. E. DAWLEY	Fayetteville, Onondaga County.

Directors.

H. E. COOK	Denmark.
JARED VAN WAGENEN	Lawyersville.
D. P. WITTER	Richford.
R. P. GRANT	
M. T. MORGAN	
Dr. W. H. JORDAN	Geneva.

Vice-Presidents.

Hon. THEODORE ROOSEVELT	Oyster Bay.
Hon. TIMOTHY WOODRUFF	Brooklyn.
Hon. W. CARY SANGER	Sangersfield.
Hon. C. A. WIETING	Cobleskill.
GEORGE H. HYDE	
CHARLES H. ROYCE	Rhinecliff.
FREDERICK H. MERRY	
W. E. DANA	East Avon.
J. P. CLARK	Falconer.
R. H. BENT	
E. J. PRESTON	Amenia.
C. M. LAMONT	Owego.
F. A. CONVERSE	Woodville.
E. VAN ALSTYNE	Kinderhook.
A. D. HARRINGTON	
V. C. BEEBE	Arcade.
G. W. SISSON, Jr.	Potsdam.

Ex-Presidents.

(Ex-officio Members of the Board.)

S. B. RICHARDSON, 1899	Lowville.
A. R. EASTMAN, 1898	Waterville.
L. L. VAN SLYKE, 1897	Geneva.
A. CHASE THOMPSON, 1896	Owego.
A. D. BAKER, 1895	Aurelius.
E. S. MUNSON, 1894	Franklin.
FRANK BLANDING, 1893	Hubbardsville.

Summary of Proceedings.

First Day—Night Session.

President Richardson called the meeting to order at 7.30 p. m. The Question Box was the first work, followed by the address of Prof. W. H. Jordan, director of the Agricultural Experiment Station at Geneva.

Miss Anna Barrows of Boston, editor of *The American Kitchen*, gave an object lesson in cookery, interspersed with comments upon the subject, "Dairy Products as Substitutes for Meats," her conclusions being affirmative of the use of the products of the dairy. The varieties of soups from milk and the uses of milk, eggs and cheese were illustrated by the accomplished teacher of cookery, with the few utensils available, and the lesson was highly appreciated by the audience. At the conclusion of her address Mr. Flanders asked her for description of proposed educational plans on the subject of cookery, and concerning the progress already made, to which Miss Barrows replied by giving a little account of the work now being done at various points in New York and other States.

A member asked her if the various modes of cookery added to the digestibility of milk, to which she replied that it was still a disputed point. Some persons could not use raw milk who could use it when cooked.

Convention adjourned to 9.30 a. m.

Second Day—Morning Session.

The Twenty-third Annual Convention of the New York State Dairymen's Association was held in the opera house at Cortland, N. Y., December 14 and 15, 1899.

Vice-President George A. Smith of Frankfort called the convention to order at 11 a. m.

Judge J. E. Eggleston of Cortland extended a welcome to the members, which was responded to by George C. Royce of Gouverneur.

The President's address followed.

Address of ex-President J. S. Shattuck.

On motion of ex-President Eastman, the president appointed the committee named herein on membership.

The convention then adjourned to 1.30 p. m.

Second Day—Afternoon Session.

President Richardson took up the gavel at 1.30 p. m. and proceeded with the question box. At the conclusion of that work the address of Professor H. H. Wing of Cornell University was read.

The address of ex-Governor W. D. Hoard of Wisconsin, "The Conformation of the Dairy Cow," followed.

Convention adjourned to 7.30 p. m.

Third Day—Morning Session.

President Richardson called the meeting to order at 10 a. m. The question box was opened and answers given.

Address of Franklin Dye, Secretary of New Jersey Tuberculosis Committee.

The President then called attention of the members to the fine and large exhibit being made in another hall and advised every member to see it before leaving town.

Address of Jared Van Wagenen, Jr.

Address of Vice-President George A. Smith.

Convention adjourned to 1.30 p. m.

Third Day—Afternoon Session.

President Richardson, at 1.30 p. m., announced the decision to omit the question box, and to hear from Hon. D. P. Witter, chairman of the Assembly Committee on Investigation Animal Diseases.

Address of Hon. D. P. Witter.

Committee on Nominations, through its chairman, F. J. H. Kracke, reported officers of the New York State Dairymen's Association for the ensuing year of 1900, and on motion duly seconded, the report of the committee was unanimously adopted.

Officers were then duly installed.

Committee on Resolutions, through Prof. H. H. Wing, made its report, and, after motions, duly seconded, the report was adopted *seriatim.*

Address of E. B. Voorhees, Director New Jersey Agricultural Experiment Station.

Address of Geo. L. Flanders, Deputy Assistant Commissioner of Agriculture.

Convention adjourned.

Third Day—Night Session.

President Richardson in the chair. Convention met at 7.30 p. m.

Address by ex-Governor Hoard.

Address by S. Y. Knight, Secretary of the National Dairy Union.

Convention adjourned *sine die.*

Essays and Discussions.

PRESIDENT'S ADDRESS.

S. Brown Richardson, President of the Association, said:

Mr. Chairman, Ladies and Gentlemen:—You have listened, this morning, to the elegant address of welcome, one which has been extended to the officers of this association for the last forty-eight hours. This welcome, this greeting of good cheer, met us at our first appearance in your beautiful village. From the sentiment contained in the attentions we have received since we came, I believe it will not desert us until we shall have left your midst. I wish to say, in response to that welcome, that you have not heard the end of it, nor will you hear it, gentlemen, for months to come. The officers and members of this association will take it with them to their homes and there will remain in their hearts a welcome corner for the people of Cortland who have given us such distinguished attention.

The Dairymen's Association of the State of New York is a growth. We meet in annual convention now for the twenty-third time, although the act of Legislature incorporating our association was not passed until 1881. I have been actively engaged in work relative to this association for only a short time, compared with the experience of many of those present to-day. While reflecting upon what I could say to you that would be of interest and of benefit, I was impressed with the thought that there was a reason for the formation of this association, and that reason was found in the fact that advanced dairymen came to see and to realize the great necessity of dairy reform more than a quarter of a century ago, and it is along the line of dairy reform that the leaders and the thinkers upon the subject of dairying for a business have proceeded. Active and thoughtful men have been continually pulling at the great curtain which hides the known from the unknown and glimpses of experimental and practical life have rewarded their effort and encouraged them in further investigation. Honest and thoughtful men, whose past experience led them to the incontrovertible fact that the world was moving, came to know that the empire of dairy production was also moving, and that this movement was towards the setting sun. Observing farmers came to know that better milk, better butter, better cheese must be furnished to consumers in his country at less cost or the wheels of progress would run them down. Dairymen who kept books found, upon the first of January, that the cow which had given milk only six or seven months out of the twelve, and a credit of only 2,500 to 3,000 pounds at that, had not paid her board, and the cry in this State was for dairy reform. Land that for nearly a century had followed poor cultivation with abundant production began to stimulate the dairyman's energies for agriculture by demanding better cultivation. Nature faced man, the greatest product of nature, and demanded of him a fair division of labor, and when the genius of enterprise pointed westward to an abundant fertility and where a generous government assisted private capital in solving the great problems of transportation and distribution, competition, incisive and healthful if you please, came to the dairymen of the State of New York and added to the powerful need for dairy reform. Strengthened by this great need for self protection, the dairymen of the Empire State of New York have instituted reforms so far reaching and so essential that they have revolutionized the methods of twenty-five years ago. Increased production tempered by scientific and experimental education have added to the value of dairy production, and have so far educated the tastes of the consumer that the crucial test of the dainty appetite is to-day applied to our milk, our butter, our cheese, our beef, at the table of the rich and at the table of the poor, three times a day and three hundred and sixty-five days in the year. The very tendency of the time rested like a nightmare on the man who would follow in the steps of his ancestors, while he who followed the incoming tide of progress saw just before him, within the horizon of his own active life, better products, better methods, better prosperity, greater happiness. The day of reform was at hand.

The great problem in the solution of which much thought has been employed and some progress made, is that of economy of production. Men who labored with their heads as well as with their hands soon reached the logical conclusion that the products of our dairy farms must be placed upon the market at less cost to the producer, and this necessity again proved the old and true adage of its maternity by bringing forth the spirit of invention, and the spirit of invention, gentlemen, has grown and extended until the destiny of the dairy farmer to-day seems almost determined by his own omnipotent wealth. Land is more easily cultivated, crops are put into the ground with less effort and in better form, while much machinery and much brute force, with intelligent direction and supervision, have come to take the place of the farm hand, and to labor with the persistence of an automaton for economical production and this economy of production has given more time for thought and the labor of thought has fixed the attention of the dairy farmer upon the study of his herd. We have learned that beneficient lesson that "cleanliness is next to Godliness," and what a lesson it is for our continued faith and practice! We have learned that he who would thrive must not jeopardize the essentials of success by carelessness as to the dairy management. We have studied the needs of the soil and while assisting nature in the release of plant food we have learned to get the broadest multiplication, and the profits of the farm follow both. Thus dairy reform has grown, and just as truly as solutions have followed problems, new problems have appeared. Better production with less cost and greater variety and ever increasing quantity have followed and filled our markets to overflowing and introduced the problem of new markets and how to assist and hold them. This problem, in the life of our association, has led us sometimes like a beacon light down a hill, and at other times it has led us backward to repair the errors into which we had fallen by unwise methods of production.

This is a nation of progressive ideas. Men in every branch of industry are looking upward and onward to the time when they may better their present condition. It is the mission of this great society to furnish to the dairymen of the State of New York a nucleus around which all can gather and each, in his individual capacity, help our great army of producers by keeping his industry well abreast of every enterprise of our times to the end that better conditions shall raise the intellectual standard of the farm and lift him to the level of the most beautiful of God's creatures, to the end that better environments shall bring more of the comforts of home and the farm to every rural fireside in our land, and to the end that our dairy industry shall attract into its life the best of men, men of brains and character, men wise in their day and generation and in their judgment of men and of methods, wise in their judgment of the wants of consumers, even as the best of conditions as to soil, as to climate, as to locality, now attract to our beautiful hills and our fertile valleys the leaders of our agriculturists. It is the mission of our great society to-day, gentlemen, to walk in the front rank and to occupy the advanced lines of dairy progress. We are unalterably opposed to all kinds of vicious substitutes and fraudulent imitations of honest dairy products. (Applause.) We believe that such imitations are vile vultures that would prey upon our agriculture in this country, and, like the angel of darkness, while masquerading in our honest garments would undermine at least one corner of that statute of liberty on which rests happiness of our national life. So far as local conditions will permit, so far as established precedent and local government will justify, so far as our own self respect will endorse and approve our action, let us live and encourage the coöperation of every State in this great Union in cutting this black spot from our dairy industry. (Applause.)

Gentlemen, I thank you for your attention. (Prolonged applause.)

Gentlemen, it gives me great pleasure to introduce to you a gentlemen, the next speaker, who was instrumental in bringing about the organization of this association many years ago, and he was at one time its honored president—ex-President J. S. Shattuck.

MR. SHATTUCK'S ADDRESS.

Mr. President, Ladies and Gentlemen:—While listening to this address I had one anxious desire which I suppose I shall never realize, that is that I could talk equally well with the gentleman who has preceded me. There is a thought brought up to my mind to say to you although it may appear a little selfish.

In 1827 there was a boy born in a very humble home in the Chenango valley in a house of seven rooms, all told. There were three families living in the house at the time. There was a cellar under one end of the house which was barely large enough to hold the potatoes and the pork and cider barrels which always had to be there at that time. That boy lived there a number of years. In 1850, he invited one of the neighboring farmer's daughters to come and live in the house with him. They have lived there and with the blessing of God they have raised four daughters, two of whom have spent two years in the southern part of Missouri, coming and going different roads. They come home every summer. They lived two years in Minnesota, going different roads, as they said they never expected to see the country in any other way. One of the daughters was teaching school and the other went to take care of the children. There were a great many farm homes, and I think many poor ones. Once they came through Canada and travelled all one day seeing but two or three farm houses. To day those girls think they have never seen anything quite as pleasant as the old home when they have got back into the State of New York. They are now living in Buffalo and think they are almost home. That boy has never been off that farm more than ten weeks. The longest time he has ever been absent, and the wife he took with him has never been except three months, and she would not have been away longer than one month then had it not been for sickness. That boy stands before you to-day. (Applause.) I am proud to be one of the number of farmers who did not know enough to get off the farm, and I confess I do not know what to talk about, but I had thought to talk about some of the mistakes of farming. I feel a good deal as I heard a man say at one of our meetings at Middletown a number of years ago. He was running a number of factories in the western part of the State. He said the men he wanted to talk to were not there; the men who needed his talk were away. It may be so to-day. The men I want to talk to may not be here, but I trust that some of you will be patriotic enough to give any suggestions that may be profitable to those who are not here; carry them home and give them to your neighbors and friends.

One of the mistakes we are making as dairymen, I believe, is that we do not all of us make the very best we can under the circumstances in which we are placed for the time being. I know some men think because they have not as good cows as some of their neighbors it does not pay to take care of them. Do the very best you can with what you have and be sure and raise some other and better stock, and in a little time I think you will be surprised at the result. This is true even of a poor cow if you give her better food and accommodations. Be sure and keep her clean if you can. As our president has said, cleanliness is next to Godliness. I think that we keep too many cows. I think the dairymen of the State of New York would be better off if they would keep what cows they can keep on their farms, and raise what grain they can feed instead of buying so much western grain. The prices at which we have been selling our products for the past few years have been ruinous, but we hope that they are going to be better. We have had better prices the past year, it may be due somewhat to the drouth in the dairy section of the State and to the fact that all industries are improving. People are getting better wages and can afford to pay better prices for butter and milk than heretofore. One thing we have got into in our county and the county adjoining is shipping milk. Almost all the milk made in Chenango county goes to Brooklyn every day. We have got into this habit of shipping milk, and I must confess, I am afraid of the result by and by. If you have co-operative factories, if they are good ones and get you good prices, I would say patronize them for all of selling milk. There is another evil in selling milk. Almost everybody says you cannot raise hogs or calves except on milk. You can raise good calves on middlings, water and oil meal. But I believe we can better raise calves than buy cows. I made the assertion, I think in Mr. Eastman's presence, some time ago, that I could raise a calf to two years old for fifteen dollars. He thought I had better figure a little. I have raised six calves at a cost not over fifteen dollars apiece, and they are now giving as much milk as cows I would have to pay thirty-five and forty dollars for. I get those calves for ten shillings apiece, in the west. They ate a ton of hay each last winter, that would cost three to five dollars a ton in our vicinity. At five dollars, that would make the cost $7.50 for the heifer for a year and a half, and the other $7.50 would keep them from the time they were born. Of course when food is higher they would cost more. I know some parties differ with me about this.

Another thing. Some of the shipping stations are located in the villages. If a man is going to patronize one of those stations, I think it is very desirable to patronize the one that is not in the village. When I look through this audience it does not seem to me what I am going to say is likely to hit anybody here. Some parties I am acquainted with carry their milk to the station in the morning and get three cents for it; they stop on the way home and drink it up. When you figure it down to the price in summer time, a cent and a half, if they had to drink milk for the value of the stuff they get at the hotel I do not believe they could hold it. (Laughter.) It would be better to take that ten cents and carry it home and give to your wife or children to buy candy with.

One of the greatest compliments I ever had in my life was from a man who worked for me a number of years. A neighbor was in my barn not long ago and he told me this man who worked for me said that he believed that if a cow kicked Mr. Shattuck straight over into her manure, he would get up and brush it off and not scold the cow a bit. I thought that was a good deal of a compliment. One other thing I would caution you, it hits not you but that other fellow; never swear at a cow and never swear at your wife. (Applause.)

President Richardson.—The secretary will make an announcement in regard to railroad certificates. The appointing of standing committees will be postponed until a later session.

At the suggestion of Mr. Eastman, the chair will appoint now a committee on membership consisting of Chairman, A. R. Eastman, George H. Hyde, A. Chase Thompson, H. E. Cook, J. E. Rice.

CONDITION OF CHEESE AND BUTTER FACTORIES IN NEW YORK STATE.

Prof H. H. WING of Cornell University.

As a great man once said "It is a condition and not a theory that confronts us," therefore I do not purpose to inquire into probable or improbable causes, nor shall I dwell on possible or impossible consequences. Neither do I purpose to try to show that the condition of butter and cheese factories in New York State is either better or worse than it is elsewhere and that we have thereby cause for either self-laudation or commiseration. What I want to try to do is to call the attention of factory men, both managers and makers, to some things that I have seen, the mere mention of which should be sufficient immediately to suggest and invoke a remedy. It is the little things of the business to which I now want to give particular attention.

At the outset I should also explain that it is only through the courtesy and because of the innate modesty of your secretary that I stand before you, for most of the observations that I shall detail were made by him, and to him belongs the credit for a great deal of careful, painstaking and sometimes irksome work.

Two years ago, when through the provisions of the Nixon Fund for the extension of agricultural teaching and investigation throughout the State, it seemed desirable to give more particular attention to the dairy industry, particularly so far as its manufacturing side was concerned, we determined to make a series of observations upon certain conditions of all the factories that were visited by any member of the staff. To this end a circular was prepared, a copy of which is given below:

Cornell University—College of Agriculture.

Report of visit to...Factory.
.... 189..
Post office .... Co.......................
Name of owner or manager..
Kind of factory (butter or cheese, private or co-operative)...............
Number of patrons.................... Number of cows................
Pounds of milk reeived daily..
How many patrons have dirty wagons...................................
How many patrons have old and rusty or dirty cans....................
How many cans have loose covers plugged with cloths..................

BUILDING.

Location (with regard to soil, elevation, shade, etc.).....................
....
....
....
Drainage ....
Condition of yard and outbuildings.....................................
Location and condition of whey and skim-milk tanks....................
Distance to pig pens or other buildings.................................
Condition of same...
Is a decent closet provided?..
Construction of building (brick, wood, ceiled, plastered or other details)...
....
Are living rooms connected with factory?.................................
Is building well and neatly painted.......................................
Is the arrangement convenient (briefly describe arrangement)............
....
....
....
Location, arrangement and construction of curing room.................
....
....
....
Milk pumping arrangements, if any......................................
Kind and condition of floor and drains..................................
Water supply...

MAKER AND EQUIPMENT.

Name of maker..
Neatness of person and clothing (mark on scale of 100)..................
Evidence of use of tobacco in factory...................................
Are small utensils clean and in order?..................................
Is the stationary equipment clean and in order?.........................
Vats?...
Presses?............................ Kind of..........................
Separators?......................... Kind of..........................
Churns?............................. Kind of..........................
(Clean and sweet.)
Workers?............................ Kind of..........................
Are the floors and walls clean and tidy?................................
Condition of store room, cold room and curing room......................
Is the room littered with useless or unused articles?...................
Is a "factory smell" perceptible?.......................................
How is whey and skim-milk divided.......................................
Mention here any other good or bad feature or condition.................
....
....
....

PRODUCT.

BUTTER (mark each on a scale of 100 for perfect).......................
Flavor.............................. Faults...........................
Texture............................. Faults...........................
Color............................... Faults...........................
Salting............................. Faults...........................
Finish.............................. Faults...........................
CHEESE, kind...
Flavor.............................. Faults...........................
Texture............................. Faults...........................
Color............................... Faults...........................
Finish.............................. Faults...........................
....

During the two seasons we have visited and reported as follows:

Factories visited more than once	20
Butter factories	45
Cheese factories	74
Dairies	5
Shipping stations	4
	148

Two of these factories were in Pennsylvania; the remainder were distributed in thirty-one counties of this State. In glancing over the schedule given above it will be seen that aside from the merely statistical part the remainder of the questions are capable of either favorable or unfavorable answers, and while it is true that in the case of no single item were the conditions found uniformly favorable in all the factories, still in the case of every item, in the majority of instances, the conditions were good and in many cases of the best. We are thus able to say that if these one hundred and fifty factories are representative of the fifteen hundred or more in the State, and we have every reason to think that they are, the condition of the cheese factories and creameries of the State is on the whole good. It is to the exceptions that I now want to call attention.

The consumer has the right to demand of the manufacturer of any food product the most scrupulous cleanliness in all details and it is therefore matters of cleanliness, both real and apparent, that will naturally demand most of our attention. It is perhaps unfortunate that because few consumers ever see the places where butter and cheese are made that so many makers should have become careless in the matter of appearances. It is for this reason that I speak of real and apparent cleanliness. It is probably true that the presence on the wall of the factory of a highly-colored lithograph of the prima donna of the last circus with her beautiful cheek ornamented with a liberal splash of tobacco juice need have nothing to do with the real cleanliness of the butter or cheese made in the adjoining vats and churns, but I am quite sure that a consumer seeing such a condition of affairs would immediately suffer from a lack of appetite for that particular product. This is what I mean by apparent cleanliness and the illustration used is not an imaginary one.

Two points that we have been particularly interested in are the personal neatness of cheese and butter-makers and the tobacco-using habit. That it is difficult to be at all times irreproachably clean while at work in a butter or cheese factory must be freely admitted. On the other hand, I think that all will agree that a lack of attention to personal cleanliness is very common and that this has a direct and important bearing upon the quality of the product. Our estimate of personal cleanliness was marked upon a scale of one hundred and I suppose, in most cases, the idea of the observer was that any grade below eighty indicated a distinct departure from that neat, clean appearance that a butter or cheese-maker should have when at work. Of the one hundred and forty-eight men, who unconsciously to themselves, were marked upon this scale the following table is a summary:

Grade over 90	29
Grade 80 to 89	54
Grade 70 to 79	43
Grade 60 to 69	17
Grade below 60	5

It will thus be seen that 83 or slightly more than one-half might be classed as, at least, fairly clean, while 65 or over 40 per cent. might be regarded as fairly dirty, while five poor unfortunates were evidently considered by the observer not more than half as clean as they ought to be. In 53 of the 148 factories visited there was evident use of tobacco in the factory and while at work. I do not know that I have any objections to the tobacco habit as such. I am willing to allow the fullest personal liberty in this respect. I do not think that my public or private estimation of a man would be influenced by the fact of his using or not using tobacco. On the other hand, I claim for myself and for many others the same personal liberty in another respect, namely, that I do not want my butter and cheese infected with nicotine, and that this infection can easily and in many cases probably does actually occur, our observations have clearly shown to us, as is seen by the following extracts gleaned from the reports:

Yes; smokes and chews. Yes; smokes, chews and drinks whiskey. Plenty of evidence; smokes and chews at the same time. Smoking constantly an old strong pipe—an awful smoker. Yes;

chews very systematically; was evidently coached by a hippopotamus, etc., etc.

I will admit that, in all probability, there is not enough nicotine present in any case even faintly to affect the flavor of the product but that is not the question. We who do not like it, claim the right to know that it actually is not there even in the most minute quantity.

Another point that has to do with the apparent cleanliness perhaps more than real, is the condition of the floor and walls so far as regards neatness and tidiness. In 83 cases the floors and walls were reported clean and in 62 not clean. The side walls of the factory vary more in construction than any other part of the factory. They run all the way from bare, unplaned boards and beams to neatly ceiled and varnished or perhaps in one or two cases tiled walls. But it is not the construction so much as the condition that we have had in mind, and we have preferred a clean, rough and unceiled wall to one no matter how nicely ceiled and varnished that has been allowed to deteriorate. In the matter of decoration, as already intimated, there is often a deplorable lack of taste to say the least, and while we do not claim that a good butter-maker should necessarily be able to appreciate high art, still the circus poster and patent medicine ad., especially when torn and soiled, are decidedly out of place on the walls of a butter or cheese room.

A matter that gave us some amusement and still is of a good deal of importance hinged upon the point as to whether the make room was littered with unused or useless articles. Forty-five of the one hundred and forty-eight rooms were reported so littered —and in this litter could have been found almost anything under the sun—cast-off clothing, parts of harness, potatoes, turnips, pumpkins, cabbages, and other vegetables useful or otherwise, appeared frequently. I do not know that a sitting hen was ever discovered, but in at least one case the old cat was comfortably rearing a family of kittens in a temporarily unused cheese vat. And in another case the good wife was prudently preparing her winter's supply of pickled tomatoes in the room where the butter was being churned.

Probably none who have had to do with dairy manufacture need to have described to them what is meant by a "factory smell." It is that which lets you know that you are near where milk is used or abused. Sometimes it is faint and elusive, and you have to chase it into a corner or down a drain or under a vat to find it, sometimes it is apparent but not aggressive, at other times, it goes out on the road to meet you while you are still afar off and lingers behind you as you depart. Wherever it is, and in whatever degree, it means just one thing, and that is, just plain dirt. Dirt that is so ashamed of itself that it is decaying just as fast as it can and trying to change into something less harmful. It means that bacillus coli-communis and his sisters and his cousins and his aunts are living and growing and thriving, and ready when their meal of dirt is over to make a dessert on good sweet milk, fresh butter or rich cheese to the everlasting damnation of the latter. In 71 factories this factory smell was present; but in 73 other factories it was entirely absent, and this is proof to the 71 that it need not have been present there.

And this matter of the smell leads us up to the drains and drainage. A somewhat curious result of our investigation has been, that we have never yet visited a factory where the system of drainage was not perfect. A uniform answer to our query "Have you a good system of drainage?" has been "Oh, yes; perfect." But it has taken only a little further investigation to show that this "perfect" drainage includes everything from a hole broken in the plank of the floor through which the waste water quietly falls to the ground below, to an iron pipe properly trapped leading through a glazed sewer to a rapidly running stream. In 68 of the factories visited, the drainage was reported good; in 64 it was reported as of varying degrees of badness. It is true that in many cases it is a matter of some difficulty and considerable expense to devise a system of drainage that will perfectly care for the waste water of factory; but in 25 of the 64 cases there was abundant opportunity for good drainage in the way of outlet, etc., that was not used. A case in point will illustrate what is meant: A cheese factory stands upon the bank of a river. The sewer outlet from the factory discharges on the surface not more than twenty feet from the water, and the drainage in the mind of the cheese maker is perfect; but in the soft alluvial soil of the river bank the liquid makes its way, but slowly, to the river, depositing much of its sediment as it goes. The result is a broad streak of semiputrid mud such as the pig weed delights to grow in which is responsible for most of the "factory smell" of that neighborhood. Five dollars worth of pipe and half a day's labor would deposit every drop of that sewage beneath the surface of the river where it would never be heard from again, and the milk wasted in gassy curds would pay for it in a single week.

Only the grossly careless, the incompetent or the filthy will use tools and implements that are soiled, consequently we have generally found churns, workers, separators, vats, presses and small tools clean and in order, but even here there is evidence that we have the grossly careless, the incompetent or the filthy among us for in 38 cases we have found some or all of the essential utensils in use in a distinctly filthy condition. Musty and foul smelling churns, soiled presses and cheese hoops and greasy tinware are most common, and though the percentage is not large it is wholly inexcusable.

Of the curing-room as a storehouse for all sorts of material, it is not our purpose to speak, as what was said in regard to litter in the making room applies equally well here. It is as a curing-room that present conditions seem to need most consideration. If temperature is a factor in the curing of cheese, the curing-room is of no use. So far as temperature is concerned the cheese might just as well be out of doors as in the great majority of curing-rooms, for the temperature of the curing-room is usually within a few degrees of the outside temperature, and is either lower or higher as the latter is rising or falling. It is true that our observations have not been extensive in this respect, and extend over only the three summer months, but temperatures in curing-rooms have been observed from 60 to 92 degrees, and in most cases the temperature of the curing-room and the outside air has varied less than five degrees. The complaint is often made that dairying dosen't pay. That the price of butter and cheese is low. That western competition is driving the eastern dairyman to the wall. That it is impossible to spend more money on better buildings or equipment, or to pay higher wages. Several factors have been discussed all which materially affect the quality of the product and scarcely any of which call for extra outlay in money or labor. So long as these conditions remain, have we right to make any of the complaints enumerated above? "To him that knoweth to do good and doeth it not, to him it is sin."

ADDRESS OF EX-GOVERNOR HOARD OF WISCONSIN.

Mr. President, Ladies and Gentlemen:—Before I enter on the more formal discussion of this topic, permit me to say that I know of no State aside from my own where my heart and interests are more deeply invoked for the progress of good things, for peace and righteousness and for those things that make for the well being of the State, than in this, my native State.

It is forty-two years since I left it and wended my way, a young man, to Wisconsin. I had been trained thoroughly in the art of cheese-making and butter making and in the care of cattle, and I went west and found nothing for my hands to do, and for years I was confronted with the fact that I had been educated as a misfit. But by and by, the everlasting punishment of the gods came to Wisconsin. The farmers of that state by wicked and wasteful processes were destroying the fertility of the State to such an extent that it would call for the loudest protest and the deepest lamentation. We got so that it was impossible to grow our great staple money-crop, wheat, having reduced in production to eight bushels per acre.

In 1870 it occurred to me that I had to step into the field and do what I could to arrest the condition of things, and then commenced the preachment concerning the cow, which has been kept up persistently from that day to this, and in answer to this gospel I have to report to you to-day a State wonderful in its development along these lines. I have seen the State of Wisconsin grow from a production of only a million dollars worth or so of dairy products in 1870, until to-day it reaches thirty-five millions. I have seen my county grow from scarcely any product whatever in that line, from a condition of 60 per cent. of the farm valuation under mortgage, with the average sales of real estate, at less than $20 per acre, to a condition where to-day it represents to my mind one of the most prosperous political units in the entire nation from an agricultural standpoint, with a population of about 40,000 and a cow population of a cow to every inhabitant and over 100 creameries.

This is Jefferson county I speak of. It has an annual earning of about $2,000,000 for the cow and the banks holding $2,000,000 deposits by the dairymen. Bankers they are, because they cannot lend money, and the farmers hunting for opportunities for investment. Prices of real estate are going up until this past year, from a recent report of the board of supervisors, and certain other facts I know of, I find that the sales of real estate, of farm lands in my county are over 9,000 acres, with an average valuation of over $65 per acre.

These things have the cow brought to these people as a benediction and a benison. And as I read in the old Rig Veda, that ancient gospel of the Indian, the Brahman and Hindoo, and read in the Zenda Vesta, the gospel of Zoroaster, the high view that was taken of this wonder-working animal, the cow, written over 3,000 years beyond the Christian era, where the clouds of heaven are likened to the celestial cow gathered by the winds and milked by the sun and from their capacious breast comes to the thirsty earth, says the Rig Veda, the milk of the gods for its blessing.

I believe in investing this subject with not only the hard figures of reality and fact, but with the grace of imagination. I read among these old Indians, in this ancient mythology, such expressions as this, 'Oh, thou foster mother of the race." Well, it is considerable of a confession that, is it not? How many children do you think are raised by this gentle mother? It is estimated that in the city of St. Louis to-day, it is over 60 per cent. It is time we began to do justice to this gentle mother, this foster mother, this magnificent expression of that divine principle of nature, and before entering on the discussion of this question I want you to come within the arcana of the influence of that idea, and we will then proceed to study the cow from the stand point of motherhood.

Shame be to the man who never to himself has said, this is my gentle, my pretty cow. Shame be on the man who never recognized in her that beautiful feminine trait, motherhood, to which the world all owes allegiance. Each of us, every plant that grows, the lordly corn, the beautiful wheat, the barley and rye, the grass, everything that grows, pays tribute and is based on motherhood. The ear of corn is the progeny and the stalk is the mother and wherever we go this fostering, nursing mother is the divine principle that we may study well to our profit.

When old Ward C. White, God bless his soul, with a face beautiful to behold, a man, one of the most successful dairymen Wisconsin could boast of, with seventy cows, made 600 pounds of cheese per cow, and when asked how he treated his cows, he put into speech that aphorism that went around the world. I read it in German in the Neus Zietung, and it was written to me by a friend from Russia. He said: "I always speak to the cow as I would to a lady." (Applause.)

In that he did not say that the cow represented to him the type of human femininity, but he did bow with a chivalry almost as great as that of the feudal ages, to the principle of femininity and motherhood and the cow rewarded him accordingly. And that is the principle upon which we must base all successful dairying. We have no business to take in to the arcana any base passions of the human breast, for if we do, we bring upon ourselves at once due punishment. When we treat the cow with due attention to motherhood, for the establishment of motherhood and its enlargement, we stable and house this mother with due understanding of the laws which govern our motherhood. We feed her on a nerve supporting food which we know constitutes the basis of protoplasm, the protein, the albuminoids, in other words we feed her with an idea to a balanced ration that she may in turn carry out the office and laws of her being, that she may make the same protein that we ask of her, in the caseous portion of her milk.

We handle her with due attention to motherhood and from the top to the bottom, in its breadth and circumference, it is motherhood that we are dealing with. (Has some gentleman in the audience a cane? I wish to use it as a pointer to these charts.)

You see before you here the picture of the famous Jersey, "Matilda 4th," a cow that made more than her weight in one year of butter. At the American Guernsey Cattle Club in New York city yesterday there were two pictures of Guernsey cows from my State, which had been going through the official test of the club for a year back by the experiment station of Wisconsin, which, by the way, does not allow of any nonsense. One of these cows made 912 pounds of butter this last year by the Babcock test, giving over 12,000 pounds of milk. The other gave over 800 pounds of butter. The two cows are owned by Mr. Byrne of Oakfield.

You may imagine I felt a little proud in that club, to feel and know that my own State, and a worthy, intelligent dairyman in it, had been so abundantly honored by these two splendid mothers.

Here you have this splendid cow, "Tritoma" (pointing to the chart). These two cows represent in every point, except breed, the dairy type of cow.

Here we have the Short-horn cow, which is used as an illustration of the different type, the beef type or temperament.

Before I start in I must read a part of a report of the committee chosen by the American Guernsey Cattle Club, to revise the scale of points, and I read this for the sake of putting before you some definitions.

The committee consisted of W. D. Hoard, Mr. Caldwell and Mr. Codman. It had been at work for a year striving, if possible, to devise and revise the scale of points, that should mean something and that should be a guide to the breeders of these cattle. Now, I use the word temperament. It is a word I was forced to adopt a few years ago for the lack of anything better to express what I felt and saw.

"By dairy temperament," this report says, "is meant a strong, over-ruling, predisposition or tendency to turn the consumption of food towards the production of milk with a high content of solids, especially butter fats, as against a constitutional tendency, so often seen, to turn it into flesh." The man who has embarked his capital, his time and attention to dairy cattle, cannot afford to turn high-priced food into flesh-producing means.

He must confine himself to the seclection of an animal which will give him the largest net return for his food in milk.

Even in the strongest dairy breeds there are more or less frequent outbreaks in the family of the flesh-making temperament. To breed from such animals while we are striving to establish a prepotent dairy tendency or temperament is not wise. All cattle bred satisfactorily for dairy purposes should possess a clear, distinct dairy temperament, for it is that quality of character we most desire to establish, enlarge and approach in the Guernsey cow, and it belongs to every one of the four great dairy breeds, the Ayrshire, the Holstein, the Guernsey and Jersey, all having the same object and goal to attain, the production of the cow that shall represent to human taste and human production the best return possible in dairy products. Now, the dairy temperament is especially indicated by the shape of the head, showing brain capacity, wide muzzle, open nostril, full, bright eyes, vigorous neck, and the construction of the backbone knuckly and strong, full of nerve power and support from the brain to all of the material organs; that means a great deal. The udder is not the only maternal organ; it is but the outer expression of the great and mysterious office of maternity. You may carry these definitions with you, and then you will understand what I mean, whether you mean it or not. In breeding our domestic animals, especially for long service, like the dairy cow, it is very important that they should have abundant vital power, which we call constitution, but constitution must be judged and measured by the peculiar function the animal is bred to fulfill. With the race horse, the function is speed. With the draft horse, the function is draft. With the steer, the laying on of flesh. With the dairy cow, the production of milk solids. That is our definition. Among all these various functions, the animal that is to represent any one of them must show not only large capacity in the line of that function, but also the ability to endure the long strain on that function and maintain good health. Constitution is best indicated by a full development at the navel and strong abdominal walls, showing that the animal, when in the prenatal state, was abundantly nourished by the mother, with a well-developed umbilical cord. That, to me, is the highest and truest and clearest judgment and indication of that power to sustain long strain that we ask and seek for in constitution.

Prepotency: Here is a new point added in the scale of cattle for the first time, we believe, in the history of dairy breeds. The reason we have included it is that prepotency is a chief consideration in the selection of our breeding animals. The conformation is often all that could be desired, but because the sire is lacking in prepotent breeding power he is an expensive failure. This quality is in a sense difficult to perceive or describe. Certain animals have it in high degree, and others fail of it completely. To illustrate: In coming down here I started two or three days ahead of time, for the purpose of visiting the Jersey herd at Cleveland, owned by Frank W. Hart. The man and the herd were worth going to see. Mr. Hart is a wholesale milliner, having to do with flowers and feathers all the time, and he has one of the finest constructive minds concerning the making of a cow that I have met, almost, in this country.

He has the sire, King of St. Lambert's King, and all of his registered daughters there before you. The prepotent power of the animal is seen in the fact that of these twenty-four daughters —I think that is the number—there is not one of them but bears the test of at least fourteen pounds a week, and some run to twenty-four, and there is not a single failure in any one of those daughters. Whence did he get his power? That is a secret that no man has yet been able to reach in the arcana and see or determine how to produce it. Chemists have dreamed they could produce protoplasm, and they have worked long and patiently and thought they could tell you of what protoplasm was made. This problem is a similar one. That animal has breeding power, and here is the wonderful expression of it. That is what we mean by prepotency. The only thing we can say about it is, be sure in selecting a sire to have reference to this matter. I wish it was more thought of as regards statesmen and politicians. (Laughter.) We would not have such a rusty, illiterate lot if we subjected them to the same law of selection that we do our cattle. (Laughter.) It is not the mother alone, but many mothers; the grandmother, the great grandmother, and the great great grandmother, and all the mothers that the good Lord has ever been able to provide. This question of motherhood has to do not only with cattle, but with civilization, as well and I do not know where you could put your hand on the destinies of this world that you do not find it playing a tremendous part. Now, then, this prepotent power is sought for. The committee said: This quality is, in a sense, difficult to perceive or describe, but we know that certain animals have it in high degree, and others fail of having it completely. It is fairly well indicated, however, by vigor of appearance, strong, resolute bearing and abundant nervous energy; those three points you need to bear in mind when you come to select a sire, and then this little talk will be of service to you. It is fairly well indicated by vigor of appearance, strong, resolute bearing and abundant nervous energy. The Mississippi river comes down from the north running between the States of Wisconsin, Iowa and Illinois, and passes along in quiet, complacent, easy flow. To me it represents the maternal stream. The Missouri comes down from the Rocky Mountains, bearing with it all the tremendous impulse that that high elevation can give it, and it strikes the Mississippi at about Owlton and cuts it clean in two, clear to the opposite bank; absorbs it and gives the Mississippi its color, and it is the Missouri thence onward to the sea. This may be taken as an indication of the prepotent power which the prepotent sire has, and which is imparted to the offspring. A dull, sluggish spirit and action we consider is indicative of a lack of true dairy prepotency, though we would prefer to breed to a rather sluggish-appearing sire, with well-placed rudimentaries, than to a stylish one with badly-placed rudimentaries. Now we are discussing the external signs of internal power, and what we see upon the cow will be based somewhat upon that question. The committee added, also, another explanation.

Rudimentary teats: We consider that the construction of a square, well-placed udder, well-shaped in the cow, is largely due to the way the rudimentary teats are placed on the sire. If they are placed close together, the result is likely a narrow-pointed udder. If they are placed lengthwise of the udder, well apart, and of good size and forward of the scrotum, the result, we think, will be to produce a well-shaped udder. We believe the future excellence of the Guernsey will be greatly added to by close attention of breeders to this point.

Let me suggest to you the work of that greatest of all dairy breeders who ever lived, DeAncy of England, who established the Pyes family of Jerseys. He bred in and in, in and in, in and in. It produced color of hair and increased size of bone and weight, and what he believed to be the external signs of hardiness, and those wonderful, great square udders which characterize the Stoke-Poges family of Jerseys, a change from the Island Jerseys, which was so marked as to call for comment throughout England. The breeders on that island had been indifferent to this power, and they consequently had not been wise enough to know good from evil. But D'Ancy looked into this deep arcana and dealt with these forces with a master spirit. If there is a man on earth who should be called God's vicegerent, it is the man who is shaping life, if he does it with a reverent spirit. He is a man who is dealing with the forces of the Almighty. It was a rule with D'Ancy invariably to reject a sire that did not show in marked degree this wide placement of the rudimentary. These things are for our instruction given.

Now, I have given you this preliminary talk, I will proceed to a little discussion concerning the construction of the dairy cow.

I have hung out a pretty good sized washing here (referring to the diagrams hung above the stage). In the center is a fancy sketch which was issued at the call of a large number of people who asked us to give what we thought would approach as near as possible the dairy form, and also to give a statement of the different parts of the animal commencing with the head measure, forehead, cheek, neck, withers, shoulder, elbow, dewlap, knee, brisket, rump, belly, side, back, pelvic arch, in the exact anatomy of the cow. The pelvic arch lies here. (Indicating the point on the diagram.) There is great confusion in the definition of these things and it is well to understand alike if we can. All of the contour is given for the sake of studying the harmonious whole, and he who judges a cow will not judge by a single point but by what the French call the *tout ensemble*, the whole thing. It is one of the difficulties of judges that after they have taken the points they do not give a review to see whether the whole thing justifies the judgment. Now we want a dairy cow, and what points I give you I will try to give the reasons for. We want the dairy cow to have a wide muzzle, because she has got to be a large eater. We want all the processes of mastication to be large and full. She may not be a large cow but we want her abundantly endowed with a large muzzle. We want a race horse with large nostril that you can put your fist into because the horse must use his lungs. The cow must energize, oxydize and vitalize a large amount of fluid through the lungs. Therefore, she must be a strong breather. She needs large nostrils. The eye is an indication of the brain and she should be endowed with a strong active brain and a full eye. A sunken eye in a horse especially is indicative, the horsemen say, of a sullen disposition. The large eye is indicative of large nervous force. The full eye makes the face dishy. That is indicative of brain capacity. If you are not sure of this follow the cow to the butcher as I have done in a hundred and fifty cases or more. I never stop to investigate a cow but, the first thing I do is to put my hand on her back. If the cow has not a good back I feel that she is imperfectly supplied with that large degree of nervous power and energy that she must have, if she answers here, the udder at this great organ. Therefore, the back should rise above the withers, that is those, processes which stand like your fingers above the backbone; spines rising from the backbone. That is indicative of a good back when they rise well above the withers until they get here (indicating on the diagram the point mentioned). The withers should be lean and sloping. (The points in the differences in shoulders of the running and draft horse were described as illustration.)

The speaker here gave an interesting story of the battle of Cedar creek, and told how a spirited horse carried him to safety when in danger of being captured. He made the point that a general purpose horse would not have answered his safety then, nor would it have done so in case of Sheridan's ride; and he applied the illustration to the necessity of avoiding breeding for general purposes when the cow for dairy purposes was the end sought. The speaker concluded with full explanation of the points as enumerated on the diagrams, and thus made them intelligible to the audience. The conclusion of his remarks were greeted with prolonged applause. The session then adjourned until evening.

CATTLE FOODS.

Address of Professor W. H. Jordan, Director State Agricultural Experiment Station, Geneva.

Mr. Chairman, Ladies and Gentlemen: I am going to give you to-night, as far as I can, a familiar talk about a familiar subject, although the subject seems just now, in the State of New York, under some new relations.

This is getting to be, as you know, a wonderfully paternal government in this State as well as in the United States, where the people as a whole, acting as a mass, are about to do a great deal for the individual, and I am sometimes a little doubtful whether in attempting to do so much by government and through bureaus we are not losing sight just a little of the individual as a factor in progress. The Legislature of the State of New York has made some legislation recently affecting the farmers of the State and certain trade interests of the State, and it so happens that the Experiment Station at Geneva is a government means of putting into effect certain of these laws. The experiment station sustains a double relation to the farmers of New York, an institution of investigation and inspection. The police work we do in the way of enforcing law, or discovering whether law is violated, is hardly, in any sense, work of investigation. Our chemists think it is pretty severe and monotonous routine work, and I am sure they are about right, because I used to help to do such work myself. I find myself very often in the peculiar position of being the executive of a law, on the one hand, where I should maintain a judicial attitude, and, on the other hand, an adviser to the farmers in which I may take occasion to say hard things about the materials which come under inspection. I remember, only two or three days ago, a gentleman representing a certain stock food, in this State, called at the station to arrange for complying with the law. I treated him just as well as I would the representative of the largest stock interests in the world. I told him what to do, while I had on my desk a letter from a certain party in this State inquiring about that food, a letter to which I must give an answer, if truthful, unfavorable to that food which he was exploiting. I find it hard to maintain the executive attitude and the attitude of an adviser.

Now, this new law in the State of New York is one enacted last winter and it is known by various designations; by some, as the Witter law, which is its proper name, I think, because the law was originated and helped through the Legislature by Hon. D. P. Witter, who is a member of your association, and he appears on your program at this time. I think Mr. Witter deserves the good will of the entire body of dairy farmers in this State for his action. I have found out that he is a man who when he gets hold of a thing hangs on with the tenacity of a bull dog and I am not sure but he is a pretty good man to get behind and build on, if there is anything you want to put through. This law has for its object the control of the feeding stuffs in the State of New York to a certain extent. Its provisions are something like these: First of all it defines what concentrated feeding stuffs are in the eyes of the law, and it excludes certain things such as hays and straws, the entire grain of wheat, wheat ground or underground, rye, barley and oats. It also excludes from the terms concentrated feeding stuffs, in the legal sense, bran and middlings from wheat, rye, but practically includes everything else that appears in the market. Just bear in mind those materials which are not included in the terms concentrated feeding stuffs, and help make this law effective. All such things as oil meal, the gluten products, the oat food products and the brewery products and products of that sort are included in the terms mentioned. I have had presented to me a number of questions of a somewhat difficult character. For instance, it is the fashion for certain western millers not to separate the bran and middlings, but to run the wheat offals into one and sell them under various names, generally not as bran or middlings but under various names, as mixed food, sometimes as "chops" and sometimes as Boston food. It was the intention to exclude wheat offals, and I have ruled—trying to use common sense—that if that mixed bran and middlings were sold as such, unmixed with other materials, not under the terms mixed food, and not under a proprietary name, but as such, they are not to be considered as coming within the terms concentrated feeding stuffs, the reason being it was not intended to interfere in any way with or embarrass the small local millers of the State who are constantly turning out these wheat offals.

There were certain reasons for the passage of this law. I must confess, my friends, to being a little pessimistic toward the business standards which seem to be controlling a large part of trade. Business success seems to be considered, on the part of many, as selling something for the largest price you can get, irrespective of merit or worth. This is one general explanation of the reason for the law. I met a gentleman, the other day, who was advertising a stock food, who virtually confessed to me that the goods cost only a small fraction of what they could sell them for, but he seemed to be very happy in the prospect of his being able to sell them for from five to ten times their real value. Now, I wish we could somehow exclude from the theories of business that idea of expediency and that idea of business sharpness and somehow come to a sacrifice of trade ideas in such matters. But the reason for the law lies closer than this, for this is only a generalization; it lies in the condition of the feeding stuffs market. Those conditions are complex. We no longer have our feeding stuffs market confined to the things which are raised on the farm, but we have a most complex variety of things offered to us with which to feed animals and I want to talk about these a little to-night, what they are and how they arise. I have samples of a few of the things on the market here on the table. The first tubes I have here are two samples of cotton seed meal. One is very light and one of very dark color. As the seed grows there is a heavy coating on the outside of the kernel and on that comes a long fibre. Those fibres are ginned off, leaving the hull with the kernel. That has a very close short fibre on it which is taken off as lint in another way. Then the hulls are cracked off and you have the kernel which is very oily. By means of pressure supplemented by heat a large part of that oil is taken out and the cake after pressing is ground into meal such as I have here in these tubes, the most highly nitrogenous food we have in the market, carrying 43 to 45 per cent. of protein. It should be light colored, light yellow and should show very few dark specks. I have here a darker colored sample which not only contains more hulls than it should, but has turned dark after fermentation. It has, instead of a nutty flavor, a sour unpleasant taste. It is always well in testing a sample to see that it has a nutty flavor, as it should have.

There has appeared in the market, in the last few years, what is called, Sea Island cotton seed meal. It is sea island only in the fact that the hulls have been ground into it, decreasing the percentage of protein to less than 30 per cent. Quite a number of samples of that kind were found in Massachusetts. It is one of the nice little tricks of trade.

I have here another tube, a sample of the meals that are sometimes ground and called cotton seed food. There is still another oil meal. I have here a sample of linseed meal, darker colored than the cotton seed, and it is all right. The various samples vary somewhat in color. It is a feeding stuff that comes from flaxseed or linseed. The oil is taken out by one of two processes. The kernels are crushed and heated with steam, or the oil is extracted after heating with a light naphtha. The first is called the old process, the second, the new process, the chief difference being that the new process contains somewhat less oil than the old. The old process contains about 7 per cent. of oil and about 35 per cent. of protein; the new process somewhat more protein; not very much more, and about half as much oil. I see no great difference in the value of them for feeding purposes. I want to say that it is one of the feeding stuffs in the market which is uniformly good and does not seem to be subject to adulteration and misrepresentation. In a dozen samples we found it one that followed duly the proper proportions of ingredients.

Among the most important of the commercial feeding stuffs to-day are what we call the gluten products. There is considerable confusion of thought about these gluten products. I want to make clear to you the distinction between what are really three grades of material among these gluten products. These gluten products come from the West. The starch is taken out by a mechanical process and either kept as starch or converted into glucose. The kernels are crushed and the hull removed. The flinty portions and starch are separated. The thing properly called corn bran is generally coarse in appearance. Here is some in this little phial. I should be glad to have any of you examine these samples after the meeting. Corn bran itself contains but little more protein than corn meal. Our friends are now taking out all the oil and it is being used in paints and in other ways. There is none of that now in what are called the Germ foods and that sort of thing. The flinty portion of the kernel, that part which lies inside the hull is separated, and it is found showing practically no hulls, but is a fine material, quite hard to the touch That is a gluten product carrying the most protein of the three. We call it gluten meal. Keep in mind the term meal as against food. This product carries 35 to 36 per cent. of protein. If the parties making these things ground the hulls and flinty portion and everything but the starch together, they get what is called the gluten food, carrying 25 to 27 per cent. of protein, and if you once instruct your eye in studying these things you will have no difficulty in detecting the difference the three kinds. The law proposes that these different things shall be marked or tagged, so, if it is corn bran, you will find a percentage of protein varying from 11 to 13 per cent. In the gluten *foods* you will find a percentage above 20 up to 27 and along there; the gluten *meals*, up in the 30s, and you will be able by that one fact to distinguish the various kinds. They will be sold for what they are, and they are a very valuable addition to the feeding stuffs on the market. I want you to bear in mind, in discussing this law, and these materials, I am really discussing trade interests and it is necessary for me to say things which apparently reflect upon trade interests. I am simply giving the facts; I must do so. You expect me to do so. I would not be fulfilling my function as director of your station if I did not state the facts according to my knowledge and light, as I see them, and if my statements apparently reflect upon the quality of the materials in the market, and their usefulness, it is because the facts are what they are, independent of any opinions or leanings I may have. Please bear that in mind.

I have here a class of materials that differs from the gluten products in certain essential particulars. You understand, the farmers raise the corn, sell it to these manufacturers and take back a portion of the grain. The manufacturer takes out what he wants and he sells the by-product to the farmer to feed, and it is well that this is so, because these by-products are valuable. In some instances the by-product comes from portions of the grain which are as valuable as the part the manufacturer takes out. I do not consider that corn bran is as valuable as corn meal because it has considerably less digestibility. On the other hand, gluten food is just as digestible. The gluten food is not quite as digestible as the corn meal because the starch is taken out; but in a general way all the corn grain is valuable and one part is not inferior to another part. To an extent that is true of the oat. Now, about oat food. They are making thousands upon thousands of tons of breakfast food in this country. We must have crushed our whole oats or wheat for our morning meal, and the quantity of that meal that is so skillfully made is enormous. When you raise good oats and sell them to the manufacturers what do they do? They take out the very light oats, and the oats that have good kernels, they hull. The kernels are what you eat for breakfast. The hulls are what your cattle are eating. Now what proportion of the oat grain is kernel hull? Several people have investigated this, and the value is about 30 per cent. That is, if you have 100 pounds of oats, about 30 pounds of that 100 consists of hull. Now what about the relative composition of it. I have somewhere a paper giving it, but no matter, I can give that well enough without referring to my notes. The hull of the oat kernel contains the most of the wood fibre. Now this matter of wood fibre in the grain is important in this way. You will find that, as rule, the more of this crude fibre there is in any feeding stuff the less digestible it is, moreover the less is the food value of it as a source of food because of the work on the part of the animal in mastication and in digestion. Recent investigations in Germany of this question show that in the case of oat straw the food value is small because of the tremendous work of mastication and digestion. Oats contain on an average about nine and a half pounds of woody matter to the hundred; the oat kernel, about ten and one-half, and the oat hulls about 37 pounds. In other words, the oat hulls contain more fibrous matter than oat straw on the average, and considerably less protein. The average protein in oat hulls is only about three and four-tenths per cent. I am talking of the clear hull, whereas other cereal grains do not fall below eight or ten per cent. Our manufacturers take this inferior portion of the grain from the good oats and they sell them back to the farmer and they are known as oat foods. The oat foods contain a much larger proportion of the hulls than oats. These hulls are being sold back to the millers of New York, and north and west, to be ground in with corn and certain other refuse products to be sold to the farmer as mixed food. That is being done to a very large extent. I have back in my desk the names of a long list of New York millers who are buying oat hulls to grind in with corn. Now, my friends, there is no more reason why you should buy clear oat hulls than to go to your neighbor and buy a portion of his straw stack to feed to your animals. So far as I have a knowledge of food and nutritive values, there is not much to choose between those two things. I have here a sample of oat hulls that came to me from a good, honest miller. He pointed out what he was doing plainly. He wrote to me and said, this law is a hardship. I have been grinding together some corn and oat hulls and selling it to my customers. I cannot do it any longer because this law prevents it. I wrote back to him that if this law so operated as to drive oat hulls out of the State of New York I should consider it a very great benefit to the farmers of the State. His reply was: Did not nature put hulls on the oats? I said, yes, but nature never takes the kernel out before feeding it to her animals, and it is the kernel that is easily digested and is the highly nitrogenous part of the oat, and it is nonsense for any trade interest whatever or any promoter of any trade interest to attempt to make us believe that it is worth while to bring these hulls back to the farmers of New York State and sell them here.

There is a sample of kernels of corn and oat hulls. The man who uses them can afford to pay for the corn and that is about all he can afford to pay for. The corn is good. Putting the corn with the oat hulls does not help the oat hulls a bit. We have a variety of meals which are made up largely of hulls, corn, and sometimes other refuse products. The first thing we have to look out for are the so-called mixed foods, chopped foods. I have some 15 or 20 samples of so-called chops taken from different portions of the State. Without exception they are all mixtures of that kind.

There is not a whole oat put back in the meal. Sometimes corn meal is ground in, dependent upon the price. You may say to me, providing these mixtures are sold at a price proportionate in value to the price of pure corn and oats, what is the harm? Well, if that is so, I do not think the oat hulls do any harm. They really do not injure you any that I know of. There is some nutritive value in them. I asked our traveling agent who collected samples for two years, to take prices in all cases, and was glancing down the prices of these chops and mixed foods the other day and I saw 18, 18, 18, sometimes 20, and two or three, more than that, at the same time that is the price that farmers could get sound corn for and put in their bins. I am talking to you of these things for your use, not to speak of things that are unusual.

There is one other class of materials I want to talk about to-night, and that is the so-called patent foods. Not a year ago I had a representative of a patent food company to see me. He opened the package and said—"Is not that nice"? I said, yes, that is unquestionably linseed meal and about five per cent. of salt and there is nothing else in it. His jaw dropped, but being a good natured man, he began to laugh, and he said, that is about what it is. He could not hold his countenance. We have taken samples of fifteen brands in the State of New York in the two years. They are being sold at the rate of from $150 to $1,000 a ton, and they are worth for nutritive purposes exactly the value of the feeding stuff there is in them and no more, and that value can be formed on the basis of our laws of nutrition and the experimental work that has been done. Years and years ago Lawes & Gilbert of England, condemned them. Recently experiment stations, to satisfy public curiosity, have condemned them, and why should you pay five cents a pound, or twenty-five cents a pound, or any other price between, for linseed meal or corn bran or glucose or anything else, when you can buy those things for reasonable prices; but you say, is it not a good thing to keep animals in health. Let me give you a list of the things put in them. Charcoal is one of them. Charcoal is cheap. Salt is another. Salt is cheap. Saltpetre. That is not costly, and you do not need much of it either. Sulphur. Well, if medicine is needed, give it to them. Sodium sulphate. That is a laxative. Iron sulphate. That is supposed to be a tonic. Gentian is sometimes put in. If your animals are being fed as they should be, they do not need tonic. To medicate an animal for fear it will be sick is a mean business. It is a good deal like that sulphur diet the boys and girls had to take years and years ago, for fear they might be sick sometime during the next year. Now, my friends, some laws are intended to prevent crime, but I think some laws are intended to take the place of intelligence. In other words, the people ask the State to do for them what they could do for themselves, if they would only give the matter careful attention. It is within your power, and it was so before this law was enacted, completely to kill out the trade in inferior things at prices that are not inferior, if the men in the State, buying cattle foods, would give the subject thorough and intelligent study as is their privilege. This law is intended to do for you what you have not appeared to do for yourselves, but let me tell you that unless you take the intelligent interest in its provisions and stand by those who have the duty of executing it, it may become a failure even now. The law will not be so executed as to do anybody harm. We are simply trying to enforce this principle in the trade which interests the farmer, that things should be sold for what they are on an honest basis. (Applause.)

I would be glad to reply to any questions to the best of my ability. I have on the table a number of the abstracts of the law. We are sending them to our entire mailing list, some 33,000 names. Anyone who has not had one can get it.

A member: Does the professor know of such a thing as cow cure, being sold and what it is?

Professor Jordan: Yes, we have analyzed it and you will get the statement in the bulletin very soon. It is sold as a medicine and not as a food. I have failed to discover anything very unusual in it. Almost all those things are made out of common materials. There are not very many wonderful things lurking around undiscovered.

A member: What is H. O. Dairy Food?

Prof. Jordan: It contains oat food, some hulls and some corn products.

Q. Would you analyze samples sent in by farmers?

A. I would not want to promise to do that. We send out travelers to get samples, and we get about all we can do or expect to do. I expect in that way to get samples of all the feeding stuffs, and having analyzed them, I feel as though it would be unnecessary to again analyze the same things. If we would open the doors, our seven chemists would be unable to do the work. We have to execute things for the greatest good to the greatest number. Any failure of samples to come up to the standard is worse for the merchant than any procedure of law could possibly be.

Professor Jordan was followed by Miss Anna Barrows, editor *American Kitchen*, Boston, who delivered an address on—

DAIRY PRODUCTS AS SUBSTITUTES FOR MEAT.

By Miss Anna Barrows, Editor The American Kitchen Magazine.

Milk and its products, butter and cheese, are important commecially because of their food value. Hence those whose business it is to handle dairy products should study carefully the bests ways of preparing milk and milk products for the market and for the table. Since milk must be the main food for infants and invalids, the importance of clean, wholesome milk can hardly be overestimated. Though there may be a little danger from the use of raw milk in the farm home, if the animals are carefully selected and well cared for, there are doubtless few easier ways to transmit disease than by means of unclean milk.

We must remember that about a fourth of the whole population of the country is to be found in large cities. The daily milk supply brought to each of these centers if it all came together would make a good-sized river, and under present methods of transmission there is almost as great danger of pollution as with any stream of water. The housekeeper should join hands with the producer of milk and cream in demanding a most rigid supervision of the city milkmen who receive the milk from the country and distribute it to the consumers. Time and expense might be saved if we could do away with the old habit of delivering milk in the small hours of the night; and it would be a further advantage if our milk carts could have established routes like the postmen, and not follow each other all over town.

Cleanliness is absolutely essential in every step of the way from the milking of the cow until the milk appears upon the table. When we see how quickly a few drops of ink will disappear apparently in a glass of milk, we can understand the ease with which milk takes up dirt.

At present there is probably less danger of the adulteration of milk with water than from its dilution by the addition of skim-milk or the removal of a portion of its cream. Watered milk will not coat a glass as full milk does, and this test is fairly reliable. To give a richer appearance the milk is often colored with a little caramel, which is harmless.

If milk is clean and carefully cooled there is little need of the use of preservatives. Although milk is a favorite food of bacteria, fortunately the majority of them are harmless.

Tyrotoxicon, the poison which appears occasionally in milk, ice cream and cheese, seems to be due to lack of ventilation and excessive dampness. "Smothered milk," as it is called, or that which is improperly cooled, puddings kept in an ice box for several days, the filling of cream puffs, ice cream which has been packed too long, and the carelessly washed nursing bottles are liable to develop this form of poison.

It is of great importance that utensils for keeping milk should be free from cracks and ridges of solder. They should be washed in cold water first, and a little soda may not be objectionable in the washing water; then they should be thoroughly scalded and exposed to the sunlight, and if possible scalded again without wiping just before using.

The consumer should be sure that the cans are well rinsed after they are emptied, and that no foreign substances are put in them. In country homes, though there may not be the same supply of hot water as in the city houses, there is usually access to sunlight, and less dust. An objection is sometimes made to the use of glass bottles, but even if there is danger of their cracking occasionally, it is possible to tell at once if they are not clean.

Whether milk is more digestible raw or sterilized is still a somewhat disputed question; but if milk is perfectly clean, sterilization is not essential except in cases of extreme illness. To pasteurize milk it is raised to a temperature of 155 degrees Fahr., but it is not thoroughly sterilized unless raised to 212 degrees Fahr.

There are many preparations of milk for invalids' use. It is "modified" to suit the needs of babies of different ages; it is peptonized and albuminized and made into Koumiss and Matzoon; it is evaporated for convenience in keeping. The malted milk has certain advantages. The condensed milk industry has increased enormously within a few years.

Not only is milk a valuable food in most cases of illness, but in nervous exhaustion and kindred diseases milk and eggs are of more value than drugs. Hot milk, well flavored, whether with cocoa, coffee or with any of the vegetables, etc., used for our milk soups, should be more generally used than it is. For summer especially milk has great advantages over meat stock for soups. The latter requires much time and fuel for preparation and will not keep well.

Milk desserts are very common, but we do not always stop to think how much nutriment they give us. Pehaps the simplest is the junket, or rennet custard, then come the blanc manges, in which the milk is thickened by the addition of Irish moss, gelatine or cornstarch, and then the hundreds of puddings made by combining different proportions of cereals, tapioca, bread crumbs and the like with eggs and milk.

Doughs mixed with milk have many advantages over those made with water only, and when skim-milk rarely commands over three cents a quart this cannot be considered an extravagance.

Skim-milk is not appreciated as it should be, for it can be used not only for mixing doughs, but with the addition of a little fat for soups, sauces and puddings.

The cream sauce or milk gravy which is the basis of many of the "made dishes" of French cooks of the cream soups and croquettes is by itself a valuable means of adding to the nourishing qualities of cooked vegetables. Here we have a combination of milk and butter rightly thickened with flour, which may be seasoned to adapt it to the food with which it is to be combined.

If we must depend upon cheap foods let us beware of "cooking butter" and the later products known as renovated and sterilized butter. A pure, clean beef fat, carefully clarified, is cheaper and far more desirable. Butter does not shorten a dough as much as an equal weight of lard, because of the water and casein which is combined with the fat.

Cheese, perhaps, is the especial dairy product which should be compared with meats, for it contains similar substances in a more concentrated form.

A pound of cheese, costing 16 cents, contains about twice as much solid matter as a pound of meat, which will vary in price. There will be less waste in the cheese than in an average piece of meat. Moreover, the cheese has the advantage of keeping better than the meat under adverse conditions. Its disadvantages are that because of its concentration it is not easy of digestion. This may be overcome somewhat by diluting the cheese with milk, as is done in many of the rarebits, fondus and soufflés. The addition of a minute quantity of soda is thought to make such dishes more digestible. The danger is that the cheese will be overcooked. If merely melted, it is probably quite as digestible, if used moderately, as many of our common ways of preparing meats. The use of cheese is very ancient, and judging from the type of people who depend upon it largely, it might be used with us more generally than it is.

When we remember what the Department of Agriculture has proved for us, that a quart of milk is quite as nourishing as a quart of oysters, for which we pay six or eight times as much, we can see that it is desirable to use it more freely than is generally done. The oyster stew is valuable because it provides hot milk and crackers, which the oysters serve to flavor.

Especially during the summer months we do well to substitute milk and cheese for meats. There are average families who do not use over a pint of milk a day; there are others who find it necessary to take a gallon, and the meat bill in the latter cases becomes proportionately small.

TUBERCULOSIS LEGISLATION IN NEW JERSEY.

Address of Franklin Dye, Secretary New Jersey State Tuberculosis Committee.

Mr. Chairman, Ladies and Gentlemen: With your permission, sir, I will do like the Irish orator and say a few words before I begin. I fixed up a good many notes of things to say, but I am admonished by the time that I shall have to limit myself as to some things I had brought to say. The mere face of a two or three days' meeting here in convention, considering the one great question of dairy interests of this State is a suggestion of the importance this question is assuming, both for the producers and the consumers. You have here in your State I believe, one million and a half cows. They are supplying milk to the people of New York, State and city, and when we look at the vast number in the United States and their value, it gives us an illustration and more comprehensive idea of the great business of dairying. Sixteen millions, I believe, there are in the United States to-day, with a valuation of $500,000,000.

* * * The health authorities and consumers are all giving attention to this question of disease in cattle, and hence we must give attention to it at the producing end. Why law on this question of tuberculosis? The consumer is entitled to protection. Therefore, we say that a common sense law, faithfully enforced, is the only power that will bring some men who sell milk up to

the necessary requirements. They must be watched. So the product goes and the money comes is all they care. Why, Mr. Chairman, I have seen milkmen coming out of their stables in the morning and you could not see what was in the bucket, except that it looked like floating manure. I have known one case where a colored man took his hands and scraped off the coarser part, and then it would be strained through the various tin arrangements and sent out to the people to drink. I say such men need law and they need to be watched. We have men who will continue to put milk on the market from cows which have running sores on their teats and udders. Through various causes, in lack of sanitary arrangements, it is estimated that the farmers in our State are losing $2,000,000 worth of plant food every year.

The New Jersey law has been in operation now some five years. I think it is proper to say that Massachusetts and New York had a tuberculosis law at the same time and prior to the New Jersey law, and attention to the subject was being directed more than formerly since our law came into existence. Philadelphia had passed an ordinance that no milk should be sold from stables that had not passed the examination. We, in New Jersey, felt that we were between two millstones, public sentiment was being stirred up and people were demanding inspected milk, and we did not know how soon the demand would be general, so in order to meet it our law was devised. I was called in to consult with some of our veterinarians over what they had arranged to introduce into the legislature. I said, gentlemen, you will never get that law passed in the form it is in, for the simple reason that it is too drastic in its requirements. You could go into my farm and take possession under its provisions. So another bill was drawn leaving this matter to the State Board of Agriculture. A gentleman present who was then in the lower branch of our State Legislature took charge of the measure, providing that the president of the State Board of Agriculture and secretary, should be members of the commission, which was to consist of seven members, five others to be appointed by the president of the State Board. With the usual contest on the floor, the bill passed and went over to the Senate, and was passed there. It is a very small bill. There is not very much of it. It does not particularize much. It gives the commission power to inspect when asked by the farmer to do so, when asked by the State Board of Health or by the State Dairy Commissioners. They were doing the work so radically in New York and Massachusetts at that time that this latter clause was put in, so that the law might be in the hands of the farmers themselves. We did not know who might take office later on and we wanted it safely guarded in that way. It has remained unchanged since. We kept it in the hands of farmers for execution. The farmers are demanding more than ever before that their cattle shall be investigated. The work of the commission is getting popular. It has proved itself to be valuable, and they want us to come because it strengthens the sale of milk. We only have $10,000 available for the fiscal year. The law adds to the market value of the animals examined. We felt that that presumption fixed the matter. Forty dollars is fixed as the maximum price for cattle which are killed, and the owner gets three-fourths of the appraised valuation, so that there is not much money in having cattle killed for the gain there is in it. We have endeavored in the enforcement of the law to be consistent and considerate. We have never dealt with farmers as though we were State officials. My course has always been, when sent for or requested to come by the Board of Health or Dairy Commissioners, to consult with the party or parties who made the application as to the course to be pursued, and before we get through the man understands it, and the way is made easy and there is no friction and no fighting and we have had no contests. We might have had plenty if we had undertaken to put on some official airs. The enforcement of the law has been an educator to the people of the State. Our law says nothing about tuberculin. The word does not occur in it. Large liberty is given to the commission to enforce such rules as in their judgment they see fit. They have never made any iron bound rules to bind anybody or hurt anybody. We do use tuberculin in certain cases to examine. Our first step is a careful physical examination. If we find five or six that have suspicious symptoms and if not quite sure we allow the use of tuberculin to supplement the physical examination. We do not inject whole herds of cattle unless the herd has what we call a rotten history. That is, where a man has been losing cattle for three or four or five years. We have just such a case on hand now. Then we use tuberculin. In regard to conservatism; it is plain that we cannot pooh! pooh! this question of tuberculosis any longer; it must be met. It must be dealt with. Science is at work and much is known, much is yet to be demonstrated and proved. On this question, and many others, there are many things that we do know and there is very much that we do not know. We like a man who can take the position that he does know and stand there. Of course we must give way a little on both sides. We know that cows and that milk become diseased, and that it carries disease into the human system of some kind. Where the milkman carries that kind of milk to town or city and sells it, the case demands law. So much for the old law. Now, we wish the State of New York and New Jersey to keep together in this matter. We saw reference to a law that excluded tuberculous cattle from your State, and we thought the law would be enacted and we said, here Pennsylvania has put up the bars. Their law went into effect a year ago last January, and if New York puts up the bars too it leaves New Jersey as a sort of dumping ground for diseased cattle from both of those states, so in self-defense we too were compelled to put up the bars and our law is now in operation. It went into effect the first of November. I think if such laws were left off the books we would all get along just as well.

A Member.—Is the tuberculin test any detriment to a healthy cow?

Mr. Dye.—We have seen no bad effects from it.

Question.—Have you a system of inspection for incoming cattle?

Mr. Dye.—Yes, sir.

A Member.—What are the symptoms of tuberculosis?

Mr. Dye.—It is impossible to tell, there are so many of them called first symptoms. A deep-seated cough is considered one symptom, but there are various others. Our veterinarians find in listening to the lungs they can tell when abscesses are forming extensively.

There is a sentiment that Jersey cattle are more subject to this disease than other breeds. I think that conclusion is hardly borne out by the facts. Other cattle handled for generations in the same way, I think, would be just as subject to the disease as the Jersey.

MODEL CREAMERY BUTTERMAKER.

By Jared Van Wagenen, Jr.

It is not easy to exaggerate the importance of the sphere of the creamery buttermaker. But because he does not figure in trades unions or trusts, and because his work is done in small isolated plants rather than in immense establishments with their crops of superintendents and their corporation methods, therefore we may be led to lose sight of him because he makes so little noise. Yet all over New York State and much of the United States, beside sleepy country roads among the hills, in quiet hamlets, or by the railroads where the expresses flash by without halting, here and there is seen the most modest-frame building with its icehouse and its receiving platform and its white steam plume from the exhaust pipe, which shows that within is being made or marred the financial welfare of a rural community. And there the creamery man stands, amid the muffled swash of the churn and the whir of the separator and the race of the belts, as the visible head of one of the most gigantic of industries.

I am asked to discuss the model creamery buttermaker. He is a very rare bird. It is difficult to describe him, and it is far more difficult to find him, and if you should be so fortunate as to do so, it might be very much more difficult to keep him. He would always be hearing the summons "Come up higher." I want to mention a few of the attributes which I think must enter into this priceless jewel, I want to put the two prime requisites first and to take hold of both horns of the dilemma by saying in one sentence that the model creamery man must be skilled in the practical handicraft of the creamery and that he must be equally well trained in the scientific laws of buttermaking. Keep these two qualifications together. Do not mention them in separate breaths. They are not meant to be divorced like church and State. They are meant to go hand in hand to the end of time. I cannot think of two more abused words in the language than "practical" and "scientific." There are men who boast of being practical when in reality they are only pigheadedly conservative and there are men who boast of being scientific when in reality they are only theorists. If there is anything I believe it is that the man who is to succeed in this world is the man who cannot only do the manual work connected with his calling but who also knows that back of all that handicraft, there lie the eternal laws which undergird his profession. After all, the difference between scientific and practical work is merely the difference between science and art. These are two words often confounded or used synonymously which are yet quite different in their meaning. Art is the earlier stage of knowledge. Art asks "How." It means training of the eye or hand together with rule-of-thumb traditions and accumulated experience. It may within its limits imply great knowledge and valuable skill and it is all that the great mass of the world asks for. But over and above art which asks "How," there is science which asks "Why." The one rests content in the knowledge that a thing is so. The other will never be content until it has discovered and classified the laws which control and govern any occurrence with which it has to deal. When we say we are practical men, we mean we are familiar with the manual details of our business, and that we know about what the probable course of events will be. When we say we are scientific men, we mean that we have so observed and thought on and studied the occurrences of our occupation that when we say we expect anything to happen in a certain way, we are able to give a reason "for the faith that is in us." One deals with facts, the other with laws. One single isolated fact may not mean anything, or it may even be very misleading. But when we have observed a long succession of facts occurring according to a general rule and pointing in one direction, then we are able therefrom to deduce a scientific law. Let me give you a concrete illustration: I saw the sun rise this morning. That is merely a fact of nature. But if I go back through all the ages, I see that this has occurred every morning, and so I say that the sun will continue to rise every morning to the end of time, and that deduction becomes a law of nature.

So we must not try to divorce these two. Do not let any man say that he is a practical man without recognizing this principal, because he is not practical if he gets hold of just one side of the truth of life. On the other hand, do not let us make this mistake and say too much for the scientific man, so-called. In practical creamery work, you may read books and hear lectures until you just bristle with facts, but turn yourself loose in a creamery on a hot, wet July morning with all the conditions that sometimes rise about that time and before noon you will be in a dreadful muss. But note, too, that if you are only and merely a practical man, so-called, and have no resources or knowledge to draw upon beyond your own working experience you are just as likely to meet conditions which you will be powerless to remedy, or even to suggest the difficulty. How well equipped for the battle of life is the man who goes into it well-drilled in both the "How" and the "Why."

Now, where is the the creameryman, who thinks that there may still be something for him to learn about his business, going to seek this higher knowledge. With all due respect for every one and for all educational methods, it seems to me that there is no place where a young man can get as much of this training in the same length of time as in one of our big dairy schools. It is worth something for a receptive man to feel even for a few weeks something of the freedom of thought and the intellectual swing of the great university. Unless he be the veriest clod, he cannot return to his creamery without higher ideals and aspirations than when he left it. That is the main argument. Then, too, there is the financial side. Many a young creameryman has found it a splendid money investment. Prof. Wing was telling me the other day of the results of eleven weeks of instruction in such a school at an expense not exceeding $100. He told me of men who, after such a course, are now earning larger salaries than men who have had four years of college in this country, and a Ph.D. from a German university. And that is only another way of saying that there are more men who are qualified to teach Greek than there are who can successfully manage a modern creamery.

Now let us look at some of the minor personal attributes which must be found in the Model Creamery Buttermaker. Perhaps as one of the most indispensable of these we may mention tact. This tact has been defined as the grace of not rubbing people the wrong way, and it is something that the public creameryman needs to cultivate above almost all other men. If the co-operative creamery has 100 patrons, at least 50 of them will each think that the whole business ability and sagacity of the enterprise is centred in himself, and of course if a man feels that he possesses such a wealth of business intuition, he cannot be blamed for wishing to exercise it. Generally the best thing to do is to smooth people, but you can't expect to keep everybody satisfied all the while. The time comes when tact does not consist in turning the other cheek. There is such a thing as telling a man with perfect politeness, but yet with absolute firmness, that you expect to manage those parts of the business which pertain to you. The strong man in a dispute or an argument is the man who only gets cooler and quieter as his opponent gets more angry and excited.

There is another respect in which the butter-maker will have to use tact and firmness, and that is in the rejection of sour or nasty milk. This is not simply a question of personal loss or inconvenience. It is a duty which you owe to your own reputation—and more, to the men whose interests you serve. That milk which is valueless or which would deteriorate the quality of the whole product must be rejected, politely but unflinchingly, and this rule must not only apply to the least influential patron, but as well, to the Lord High Executioneer, the secretary himself. But to do this a man must have the nerve that was in one of "Commodore" Vanderbilt's steam-boat captains, who had received strict orders to tolerate no "dead-heads," and always to leave the dock promptly on time. So one trip he rigidly collected fare from the Commodore, and the next he calmly steamed away although he saw his employer charging down the pier and wildly gesticulating the captain to wait a bit.

And then the model creameryman must be polite. I think that one of the highest compliments ever paid to any man is what was said of Lord Chesterfield; that he was so suave and gracious in his address that it was more pleasant to be refused a favor by him than to be granted it by another man. I know that there are some things which screw the heart of the man who tries to be polite. There is the woman who wants to buy a quart of buttermilk for a penny and the boy who wants you to give him a little skimmilk, and you must stop when you are very busy and get it for them. But you will have to console yourself by thinking what splendid moral discipline you are getting.

Another great requisite for the buttermaker is iron-clad honesty in the broadest, fullest sense of the word. Understand there is honesty and honesty. Honesty is not altogether a matter of dollars and cents. It does not take a very high type of honesty to get up to that. But there are other and finer things in the world than simply not stealing a man's money. There are thousands of men in the world who can be implicitly trusted in all matters of cash, neither will they falsify weights, or in fact do anything on which the law can put its finger. But the loftiest integrity is that of the man who is honest with himself. It is the man who puts into his work the very best that is in him, and is content with nothing less. Take this example: You are running a Babcock test, and the fat does not come up just right. There may be black specks in it, or white casein, or it is cloudy and you do not feel just sure how it should be read. If you are an honest man you will not do that which is so much easier—guess that it was about so—but you will run it over again so that, if necessary, you could come in the Supreme Court and swear that it is so and so. This is only one of many illustrations that might be given.

"This above all, to thine own self be true,
And it must follow as the night the day,
Thou canst not then be false to any man."

And then again, the model creameryman must stand for intelligent progress and not for slothful conservatism. As we go through the world let us try and walk with the onward procession, and not simply stand and see it go by. I want to give you an example of what hidebound conservatism will do for a nation—or for a man.

At the middle of this century, the two great Mongolian nations of Europe looked out over the Pacific with the same stolid unchanging gaze that had been theirs for 3,000 years. Their boast was their age, and their pride was their immovability. In that decade there was presented to these nations the solemn issue that comes to the life of every individual. There was asked the hoary question, "Choose ye this day whom ye will serve." There was presented once more the momentous choice, "I set before thee blessing and cursing." In other words—the world offers you continuance in your ancient conservatism, or it offers you light and progress and civilization. How did they answer that fateful question? Japan roused and shook herself, and to-day there is no diplomatist in any capital of Europe who dares to hint at such a thing as the partition of Japan. China said: We will have none of it. We only ask to be left alone, to be suffered to sit here untouched and undisturbed by the progress around us. What was the result? The vulture nations of Europe are just hovering over that poor decrepit old empire, scarce willing to wait till she be decently dead before they devour her. And so I say again that the butter-maker must keep step to the stirring music of his day and generation.

I had thought to give a short homily on cleanliness, but Prof. Wing with his creamery to creamery visitation and his array of figures has covered that field far better than

I could. So I just want to say a few words which shall be both an apology and a plea. Occasionally we read of the refined elegance which should characterize the costume of the butter-maker. I want to say as having passed a good part of my life beside the churn and the separator that a man cannot always appear in an immaculate white duck suit. You cannot take in milk, oil a separator, lace a belt, lift a dozen not over clean cans, crawl half way out of sight into a churn and spend your odd moments in firing a boiler with soft coal and then look as crisp and fresh as if you were running the model dairy at the Madison Square Garden Food Exposition. It is only in pictures that a man can wash a separator well and expeditiously without rolling up his sleeves, and I expect that a man will ordinarily get somewhat sloppy about his ankles.

So much for apology. Yet I want to urge you "So far as lieth in you" to try and keep at least half way clean and decent. I have heard of a man—not an imaginary man either—who made cheese and chewed tobacco and spit in the vat. The public has a right to demand that their products shall be made in a place and under conditions which shall at least be sanitary if they cannot be fastidious. So I am sure that the model creameryman will not let rotten milk accumulate under movable articles or inside separator frames, nor will he let the corners of the churn or the seams of tinware become filled with yellow casein, neither will he wear one pair of overalls until the original material and color of the fabric becomes a question for debate. And I am further sure that he will see to it that all surfaces and utensils which come in contact with milk or cream are subjected to boiling water or live steam at least once each day.

And now I wish to speak for a moment on just one point more, and that is that your butter-maker be a clean man in that broader and better sense in which we sometimes use that word.

I don't want to preach, I don't want to say that your butter-maker must be an elder in your church or the president of your Christian Endeavor Society—but what I do want to say is this—that as he comes into, not only the business life, but as well the social life of your community, he will be a man whose influence makes for righteousness and not for wrong. I care not how keen he may be intellectually, or how diplomatic he may be in his dealings with the patrons; I care not if his butter always grades extras and sells at top quotations; he comes into your community and will be an example to your little boys—he may be an associate for your sons and your daughters—and if he is a man whose life tends down and not up, then he cannot be the model creamery butter-maker. After all, the one thing altogether indispensable is character, and I wish that he could be a man into whose mouth we might put those fine lines which Tennyson wrote of the knight of old, "My strength is as the strength of ten, because my heart is pure."

PROBLEMS IN CHEESE-MAKING.

By Geo. A. Smith, Dairy Expert, Geneva Experiment Station.

The subject assigned me will be conceded by those of you who have a knowledge of the business to be of such broad scope and much of it of so much importance, that to attempt to cover the ground in the brief time which can be given to it now would be out of the question. Consequently, I will try and take up only a few of the points which I consider of prime importance.

Judging from the way very many people go about the business, we would be led to suppose that it did not require very much training or previous experience, but those of you who have been in a position to know will, I think, agree with me that there are very few lines of work in which the manager has so many difficult points to decide, and do it at once, as does the cheesemaker. In most kinds of work it is possible to stop and figure out with reasonable certainty what the result will be from a certain line of procedure. But the cheesemaker has no such opportunity; the vat of milk is before him, some complication shows itself, and he must decide what to do on the spur of the moment and go ahead. If he succeeds, all right; if not, he has some poor cheese on his hands for which he must take the blame, although he has worked hard and used his best judgment to overcome the difficulty. He may see afterwards how a different way of working might have been better, but he could not see that in the beginning. The perishable product he was dealing with must be manufactured into cheese at once, and the results accepted. Whether they are good or bad will depend to quite an extent on his previous experience with and knowledge of the product with which he is dealing.

Most farmers believe that good or bad cheese depends entirely on the skill of the cheesemaker. While they will allow that there may be such a thing as the milk not being in quite as good condition as it might be at times, they are not willing to allow that it should make any difference in the product; in other words, they believe the cheesemaker should be smart enough to make fancy cheese out of anything that may come to the factory that looks like milk. A very pleasant frame of mind for them, but rather discouraging for the cheesemaker. I do not wish to be understood that the cheesemaker is always perfect, and, as I said before, that poor cheese may not sometimes come through his fault. A competent man is not infallible. He, like everyone else, is liable to err in judgment, but the chances are against his making very many mistakes. I wish this was true with all the men making cheese, but there is a class of them in the business, I am sorry to say, which, from a financial standpoint, it would be very much better for the farmers if they were in some other business. If the milk is in good condition and everything connected with it all right, they may make a good cheese, but it is largely a question of chance. They have neither the judgment nor skill to know when the conditions are perfect, and when one of those times comes that requires quick judgment and a thorough knowledge of the business, they fail, and the result is poor cheese.

In some cases the farmer is to blame for such men having charge of a factory. It happens in the case of a small factory owned by a stock company. The business is not profitable, and in their desire to reduce expense they hire the inexperienced man, because he can be obtained for five or ten dollars less a month, a very small item, if they only realized the fact that it was possible for him to lose for them on one vat of milk of 5,000 pounds the difference in wages. One cent a pound on those cheese amounts to five dollars, but they do not realize it in the same way as when paid out in wages. Another way in which it is possible for him to make a considerable loss is in the way he handles the milk, and later the curd, all through the process. A loss of one or two-tenths of a per cent. of fat more does not seem to be of much account, but when we take it in the aggregate for quantity, and the better quality also, in the year, it amounts to considerable money, which should go to increase the amount which the farmer needs to make the business profitable.

I hope to see the time, which I am sure must come, when every man who has to do with the manufacturing of milk into either butter or cheese for other people will be obliged to pass a strict examination showing that he has a sufficient knowledge of the business properly to protect the interest of the people he is working for. The successful cheesemaker must be a man of more than ordinary ability; he must not only be able to handle the milk and the curd in such a way that he gets the most and the best cheese out of it possible, but he must also have the tact to meet the farmers in such a way as to keep them good-natured, and, at the same time, have them understand that no milk will be accepted only as it is delivered in good condition, and that it is for their interest that it should be so.

When the farmer with three or four large cans of milk in his wagon drives up to the delivery window on a hot July morning and the covers are removed, sometimes there is a faint, sickish, sweet smell comes up to the maker's nose, and he says to the farmer "Your milk is tainted, this morning." Such cases make trouble unless the maker understands the causes which have brought about the condition. When milk sours, that is plain to see, and the farmer understands what happens when you attempt to do anything with it. Taints are different. Often they are not easily detected, and to a person unaccustomed to working in the milk and seeing the results, they would not be noticed. For that reason the man at the weigh-can must be able to make it clear to the farmer why it is so, and what the results will be if he takes the milk into the factory and tries to make cheese of it, doing it all in a pleasant, gentlemanly way. A little loss of temper and a few heated words often result in irreparable damage to the factory by sending the farmer away believing that he has been unfairly dealt with; so he goes to a neighboring factory, where the maker uses more discretion and everything goes smooth; where, if there had been a little tact used in the first place he would go away feeling that the maker intended to be honest and was trying to work for the best interest of all concerned.

The foregoing would apply to the man who does not really intend to draw bad milk to the factory or creamery. It is a question of his understanding what constitutes bad milk. I wish I could say I believed every man who drew milk to a cheese factory had the right intentions and did not intend to deliver anything only good, clean, honest milk. A gentleman with whom I was conversing on this subject not long since said he feared the millennium would come before it would be true, and I don't know but he is correct.

It may be that some of those present will remember hearing that true friend of the farmer and one of the pioneers in this line of work, the late Col. F. D. Curtis, say that we were first cousins to the hog. I am inclined to believe he was right, in some instances at least, and that there are people who have more than their share of the swine nature, judging from what I have known them to do with milk which they intended to draw to a cheese factory. If they would only stick to the proposition of never taking milk there, only when they would be willing to drink it themselves, it would help quite a little, but when they take the milk from the cow with the diseased udder, from the ones that give thick, bloody milk, or any other like milk, it is a very discouraging situation and a difficult problem for the cheesemaker to solve. That class of people hardly ever attend a meeting of this kind, and if they did they would not get any benefit, as they would not pay attention to anything that might be said, only as it agreed with their perconceived ideas. Then we have that other man who does not intend to do anything wrong; he simply don't think. You call his attention to the fact that the milk is not fit to use and he is surprised that such a thing can be possible. He is sure he has not done anything, which is usually true; he does not think it necessary to give it any attention. The generally accepted idea with a large class of farmers is that if they put the milk in the can and leave it outside of the building over night, after milking in the morning, taking the night's and morning's milk to the factory when it happens to be most convenient, only to get there before eight o'clock, or whatever time the factory man has set that he will not receive the milk after that hour, they have done all that can be possibly asked of them. In other words, that they have nothing to do with the successful operation of the factory farther than to get as much milk out of the cows as possible and get it into the factory, no matter how low a per cent. of fat it contains so long as the law does not interfere, and so long as the milk is not sour, there is no possible reason in their estimation why the maker should not get a large yield of cheese of the finest quality, and if he does not they are the first to enter complaint. If this class of farmers could by any possible means be reached in a way to be convinced that it is impossible to make fancy cheese that will hold its flavor and please the consumer, only as you have clean good milk to work with, it would work a revolution in the whole business and the hard problems would disappear very rapidly. But I have not found out yet how they can be persuaded to use the care and do the necessary work to accomplish that very desirable condition.

If the business was in shape that the factory man could do as the condensed milk factory does, keep a man going from farm to farm seeing that everything was kept in good sanitary condition and that one of the unchangeable rules was, that no milk would be received at the factory only as it was free from taint and perfectly sound, it would solve the whole question; but the cheese business as at present managed will not admit of any such expense, because the price obtained is too low, as a rule, to give the farmer anything like a reasonable compensation and pay the cost of manufacture and the extra expense of an inspector. It has been proposed to have the State take it in charge, passing a law making it punishable by a fine for any person to offer milk to a cheese factory or creamery of the character which we have been talking about. Whether such a law could be enforced is a question which could be answered much better after a trial. One thing is sure, in some way the average condition of the milk delivered must be improved, as the people who are doing everything possible to keep their milk in first-class condition will not submit to the loss caused by the neglect of this other class. Some one may ask the question, What constitutes good, sound milk? And my answer will be: Milk from healthy cows well fed and cared for, the stable where the milking is done ventilated in such a way as to keep out all bad odors, that the dust and cobwebs are kept swept down so that there is no collection of bacteria to be stirred up at every gust of wind and lodge on the cows and from them brushed back into the milk, that the person doing the milking shall be cleanly in his habits and in every way avoid exciting the cows, and finally the milk put in clean utensils and cooled down to a point that the development of undesirable bacteria will be checked. I am sure there is nothing so difficult in this but that the man who is looking after his best interest and has any desire to do his part, will see that it is properly done every time.

The next problem is to convince the farmer that there is a difference in the cheese-producing power of different cow's milk. When the cheesemaker who understands his business thoroughly and is working to build up the business on a permanent basis has his patrons educated up to the point where they always bring the milk in good condition, then it is time for him to take the next step in advance. This may be as difficult a problem to get all the farmers to understand and agree to as the question of taking good care of their milk. The milk has been pooled and divided on the basis of weight so long that it is not an easy thing to make such a radical change, as the substituting of the plan of dividing the money received from the sale of their cheese on the pounds of fat contained in the milk delivered, rather than on the old established plan of pounds of milk, which is so easily seen and understood. Previous to the invention by Dr. Babcock of the machine bearing his name for determining the fat content of milk, no one had thought of such a thing being possible, or if possible, necessary. Those who had to do with the milk knew that under certain conditions they were able to make more cheese out of the milk. This was especially true in the fall, and the reason ascribed was that the cool nights made it possible to keep the milk in so much better condition that they could make cheese at a considerably less loss, and in that way obtain larger yields. This was true in part and should be a convincing argument with the farmer that he should keep his milk in that condition all the time, but it did not account for all the increased yield. With most dairies the cows were fresh in the spring and the consequent shrinking in the flow of milk meant an increase in total solids, but that the fat of the milk had anything especially to do with it, no one supposed. In fact, it was a very generally accepted theory that there were some cows which did not produce large quantities of milk, yet were very good for the purpose of making butter, but they were of no especial value for the making of cheese, while the other cow that gave the large flow of milk was the cow for making cheese, but often not very good for butter. Since we have had the machine to test the milk, and know how much fat it contained, we have found the old idea was not necessarily true. While it is desirable to have the cow produce a good flow of milk, it is also necessary that it should contain a good proportion of fat. If we study the following table, giving the production from 100 pounds milk as taken from actual work done at the station the past season, we will see why it is not fair to all the farmers concerned to pay for the milk on the basis of weight.

	Water per cent.	Fat. per cent.	Casein, per cent.	Ash, per cent.	Total nitrogen compounds, per cent.	Pounds.
Skim milk	90.45	0.01	2.85	0.82	3.54	....
Cheese	48.00	0.34	....	5.00	40.70	....
Composition:						
Cheese, 100 pounds milk	3.36	0.24	2.85	0.35	....	6.80
Milk, 3 per cent. fat	88.30	3.00	2.25	0.63	2.75	....
Cheese	37.50	32.45	....	3.50	23.60	....
Composition:						
Cheese, 100 pounds milk	3.38	2.82	2.15	0.32	....	8.67
Milk, 4 per cent. fat	87.25	4.00	2.62	0.77	3.30	....
Cheese	37.50	33.75	....	3.30	22.80	....
Composition:						
Cheese, 100 pounds milk	4.13	3.80	2.52	0.35	....	10.80
Milk, 5 per cent. fat	85.95	5.00	2.80	0.78	3.55	....
Cheese	37.50	37.50	....	3.30	21.45	....
Composition:						
Cheese, 100 pounds milk	4.73	4.73	2.70	0.44	....	12.60
Milk, 6 per cent. fat	84.90	6.00	3.00	0.78	3.80	....
Cheese	37.50	38.70	....	3.12	19.70	....
Composition:						
Cheese, 100 pounds milk	5.52	5.70	2.90	0.48	....	14.60

Skim cheese, 6.80 pounds, at 2 cents	$0 136
3 per cent. milk, equal to 3 pounds 6 ounces butter, at 20 cents	675
	81
3 per cent. milk, 8.6 pounds cheese, at 10 cents	0 867
4 per cent. milk, 10.80 pounds cheese, at 10 cents	1 08
4 per cent. milk, equal to 4½ pounds butter, at 20 cents	90
5 per cent. milk, 12.60 pounds cheese, at 10 cents	1 26
5 per cent. milk, equal to 5 pounds 10 ounces butter, at 20 cents	1 12½
6 per cent. milk, 14.60 pounds cheese, at 10 cents	1 46
6 per cent. milk, equal to 6 pounds 12 ounces butter, at 20 cents	1 35

On this basis of 2 cents for skim-cheese, 10 cents for full-cream and 20 cents for butter, we see that with 3 per cent. milk, as between making full-cream cheese and skim-cheese and butter, there is a difference in favor of the former of 5½ cents per hundred pounds of milk; with 4 per cent. milk made into full-cream cheese or skim-cheese and butter the difference would be 4½ cents in favor of full-cream cheese, but this is a small item when we come to make a comparison between the value of 3 per cent. and 4 per cent. milk made into cheese. Here we find the difference of one pound of fat makes a difference in the cheese-making power of the milk 2.13 pounds, at 10 cents, 21.3 cents, a rather heavy premium for the man with the rich milk to pay for the privilege of pooling his milk with the man having a less per cent., and not a pleasant subject to contemplate when he figures it out in dollars and cents.

In discussing this last part of the subject, we have not taken into account the effect on the market of selling the skim-cheese and the cheese made from the milk with a low per cent. of fat with the consumer. When a piece of it goes on the table it does not disappear very rapidly and they are not anxious to purchase any more. A very different condition from that which happens when the well-made cheese from 4 or 4½ per cent. milk is given them. I found the past summer that people who said they did not care especially for cheese, when I gave them a mild, well-cured cheese discovered that they had quite an appetite for that kind and increased their orders very rapidly. I am quite sure that if we could have this matter thoroughly understood, so that every one keeping cows would see that it was for their interest to have the milk paid for on the basis of the fat content and only good cheese made and put on the market, it would go a long way toward increasing consumption, and in that way prevent the danger of over-production and consequent lower prices.

Another of the problems we have been working on at Geneva the past year is the question of the effect of temperature on the curing of cheese. When it was decided two years ago that we should have a new dairy building at the Station, one of the principal things that Dr. Jordan, the director, looked after in preparing the plan was that there should be some rooms arranged so that the temperature could be controlled without in any way being affected by outside conditions. There are six of these rooms, with a four-foot passageway around them, so they do not come in contact with the outside wall of the building.

They are further insulated by double walls and two air-spaces thoroughly covered with building paper, both for the outside wall of the room and also between the separate rooms. With this protection we are able to control the temperature in each of these rooms within 2°, running each room separately and at any degree between 40° F. and 90° F. We are able to do this by having a hot-air flue from below and a cold-air flue from the chamber in the attic containing the ammonia. Expansion coils and brine tank lead into each room. These flues are closed by dampers operated by compressed air and controlled by thermostats. This gives us conditions as near perfect as possible for studying the effect of an even temperature in the curing of cheese. We have not put cheese into the extreme high temperature which prevails in many curing-rooms during the summer, thinking it was better to show what good conditions would do first, then take up unfavorable conditions later. The temperatures which we have used the past season are 70° F., 65° F., 60° F., and 55° F. To illustrate the effect, I will give the scoring of some of these cheese kept at the different temperatures. The scale used was 45 for flavor and 30 for texture in a perfect cheese. We will take first a cheese made March 20th and a part put in the 70° F. room and a part in the 55° F. room. They were scored first on June 20th, and those in the 70° F. room showed 42 flavor and 27 texture; those in the 55° F. room at the same time showed 45 flavor and 30 texture. The same cheese scored September 5th, having been kept in the same temperature during that time, showed for the 70° F. room, 40 flavor and 27 texture, and the 55° F. room, 45 flavor and 30 texture. These cheese analyzed when green showed a moisture content of 36.61 per cent.

Cheese made March 22d and put in a temperature of 65° F. scored on June 20th showed 43 flavor and 29 texture. The same cheese scored, September 5th, showed 44 flavor, 30 texture. The analyses of these cheese showed when green 36.9 per cent. moisture.

Cheese made March 24th and kept in a temperature of 60° F., scored June 20th, showed 44 flavor, 30 texture; the same cheese, scored September 5th, showed 45 flavor, 30 texture; moisture in the green cheese, 38 per cent.

Cheese made March 28th and put in a temperature of 55° F., scored June 20th, showed 44 flavor, 30 texture. The same cheese, scored September 5th, 45 flavor and 30 texture.

I could give you many other scorings, but it is not necessary, as they all show the same thing, that the higher temperature tends to a loss of flavor, while the lower temperature shows fully equal at first scoring and rather improves with increase in age, really growing more perfect in flavor. The facts which I have given are a repetition of results which have been secured in factory work when they have had the curing-room so constructed that the temperature could be controlled to the extent of preventing radical changes. Prof. Dean in his talk before you last winter showed this very conclusively. In Wisconsin they have been working along the same line, and they report that the results show a very much more satisfactory product from curing at the lower temperature.

The old-fashioned cheese, that was made with considerable moisture and salt and would make the mouth smart when eaten, is not the kind to build up the business with. Neither is the cheese that is dry and hard and lacks flavor, the desirable kind. What we must have is a cheese without free moisture to get sharp, but with sufficient moisture, well assimilated, to keep the cheese soft and palatable. The Canadian cheesemaker was told that a very important factor in making the business a success was good keeping quality. and so he went to the extreme in making a dry cheese; but he found that when it reached the English consumer it was not satisfactory. Now these cheese-makers are working to make a milk cheese, solid and meaty, and still with moisture enough to make it palatable, and are making the curing conditions such that the cheese will keep.

What is true with the English people is especially true with the American. They do not like strong cheese, nor that which is hard and dry, and the outcome is that when that is the only kind on the market they go without, and we wonder why the American people consume so little cheese.

There are a large class of cheesemakers who when anything is said to them about catering to this taste, will answer that it is out of the question for him. He guarantees the cheese to pass the buyer's inspection, and in order to be sure that he is safe must make them hard and dry, or they will puff up and go off flavor. With the curing-room conditions such that the temperature will follow that prevailing outside very closely, this would usually be true. In many cases the temperature is so high that the fat is melted out of the cheese, nearly ruining them for any market which is at all critical. In other cases, when the temperature does not go quite so high as to reach the melting point, it is high enough to start into activity bacterial action of the kind which produces bad flavors in the cheese, even though they are dry and hard. The work we have done the past year proves very conclusively that with proper curing-rooms we can make a radical improvement in our cheese. With all these facts before us, knowing that the American cheese consumer does not want the rank-flavored, dry, hard cheese, it would seem to be the wise plan to try and conform to their taste, and by so doing increase the consumption of cheese. If we do not, someone else will, and the opportunity will be gone for New York cheese producers.

President Richardson.—Hon. D. P. Witter, chairman of the committee from the Assembly who are looking into the question of animal diseases, is with us and will give us a talk.

ADDRESS BY HON. D. P. WITTER.

Mr. Chairman, Ladies and Gentlemen:

You understand, this committee was appointed at the close of the last legislature, and it was appointed to investigate the subject of animal diseases in the State, the causes of infection, etc., and to give a report to the Assembly not later than February 1st.

It would not seem right or proper for me to say what I think that committee will report. It seems but fair to that committee that the members should first formulate their report and then give it to the public. However, I have been asked to talk on some portions of our investigation, so I shall endeavor to tell the truth, but I cannot at this time tell you the whole truth. It was the work of the committee to investigate all animal diseases, contagious or infectious, but the disease of tuberculosis was the main object of our work. I may say, there are other diseases of our farm cattle and animals that, in my opinion, need as much or greater attention than that one, because there are other diseases from which the dairymen of this State suffer more every year by far than they do from tuberculosis in cattle We have visited in all four States, and we have in our possession the laws, methods, results and expenses of executing the law in this State, Pennsylvania, New Jersey and Massachusetts. We have heard this morning of the New Jersey law and its workings and I can only hint, in the brief time at my disposal, at the law of some of the other States. It may be interesting to you to know about the number of cattle that are supposed to have tuberculosis in this and other States. In Pennsylvania the State verterinarian, Dr. Pearson, said that when he took up the work about 24 per cent. of the Jersey cows of the State would respond to the tuberculin test, so far as he had gone. He had visited the worst diseased herds. In Massachusetts, Dr. Peters testified that he thought at least 23 per cent. of the dairy cows of that State would show tuberculosis upon a physical examination, and in the neighborhood of 30 per cent. of the cows of Massachusetts would respond to the tuberculin test. In our own State, as far as we are able to judge, we have very much less of it. In Massachusetts, Dr. Peters has said that if they did not have any more tuberculosis than we have, they would think they had a very easy thing to control the disease in their State. In the sections we have investigated we have found that about seven per cent. of the cows would respond to the tuberculin test, so we feel encouraged that we have not so much of it as the adjoining States. In this investigation it is somewhat necessary that we should couple bovine tuberculosis with human consumption as it has been believed that many of the human family die from the disease after having contracted it from milk and meat of our cows. So we have investigated along these lines. The burden of our investigation has been to try and determine the identity of the bacilli in animals and man, and I can give you a little bit of the evidence along that line. It is very contradictory. Some believe that it is very transmissible, while others hold that it is not in any degree. The other States seem to consider this an agricultural rather than a public health question, and this is the only State, as far as I know, that ever has had any control of it as a public health measure, that is, control in the hands of the Agricultural Department or a commission composed largely of farmers, as it is in this State. In this State, I might say, it is in the hands of a committee who are members of the State Board of Health. We have in this State nine members to that board and those nine members select two of their own number who have charge of this work and they are doctors, not veterinarians. Massachusetts has been very radical in her measures to exterminate tuberculosis. They came to the conclusion that one-third of their cattle had the disease, and this led to a large expenditure of money and a large slaughter of cattle. I believe, three years ago, an appropriation of $240,000 was made in that State. In that State they have only 212,000 cows, while we have a million and a half. A proportionate expense in our State would mean two millions of dollars to exterminate tuberculosis. Such was the opposition of the farmers that the next year no appropriation was made. One veterinarian I know was compelled to leave his town on account of the indignation aroused among the farmers. Last year they passed a new law and are now working on very different lines. Their last law is very similar to the one we heard of this morning from Mr. Dye. They cannot force an examination and tuberculin test upon the farmers. They can only go upon his invitation and then they act only as far as the physical test goes.

I want to read a little of the evidence of Dr. Abbott. I have not before this time given any of this evidence to the public, although I have been requested so to do. I will read the questions and answers:

"Q. You are secretary of the State Board of Health? A. Yes, sir, I have been for 18 or 19 years.

"Q. You are acquainted with the working of the cattle commission? A. Quite well, but not so well as our own work. I think it is in a very much more satisfactory condition now than it ever has been. The radical measure did not produce as good results that they expect from the present conservative law.

"Q. Do you think the public health is properly guarded by the tuberculosis commission? A. I should think so as far as it is concerned. I think so, certainly. It is a question of evolution. We have been going through a process of evolution in Massachusetts in regard to cattle inspectors. The present board seem to be taking hold of the subject in better shape than in some time. I do not know all the points in it as well as I ought to, but it seems to me they have the subject down to a more satisfactory way of working than they have had for some time."

That is the evidence of a man who has long experience with the State Board of Health of Massachusetts.

Now, about the question of human consumption. It is an encouraging part of this work that we found a substantial decrease in human consumption, not only through this country, as far as I know, but throughout England and those countries where we have the record, and I may say that in addition to the evidence we have taken from 60 witnesses, I have in my possession the report of the Royal Commission of England, who have just finished their work and sent in their report. They have been taking evidence for two years. They have not only taken testimony in their own provinces but they have also visited Germany, Belgium, Denmark and other countries, and with this report and the evidence we have taken I do feel that this commission has the most complete evidence of any commission in the world. I believe we have in our possession approximately all the light that science can give at the present time. The decrease in England from 1850 down to 1898 has been at least .39 per cent., that is the decrease in death from human consumption. In our own State we have not kept the record so long, but it is certainly on the decrease. We have close to 13,000 people die every year from consumption. In Massachusetts their reports show, for an indefinite period, 42 in every 10,000 people die yearly from consumption. In that state where bovine tuberculosis is so very prevalent there is shown a decrease of 50 per cent. in the death rate from consumption in 44 years. This perhaps is due to a better knowledge of the disease and a better understanding and obedience to sanitary law. Now, if that be so in the human family, why not true in the bovine race? Cannot we as a State expend a portion, at least, of our money in educational work better than in the destruction of cattle? I know of no better channel to reach the farmers of this State than the Farmers' Institute work along those lines.

I have but a moment to refer to the evidence of Dr. Theobald Smith of Massachusetts. His name is not a new one. He was formerly connected with the Department of Agriculture at Washington. He has been for about six years connected with Harvard University, and in the laboratory he has been investigating, during that time, supported by the money of the experiment station of the State, on the identity of the baccilli in man and animals. I will read here a little of his evidence because it may be some time before this matter reaches you through the bulletins. I know you will not take advantage of it and I know of no reason why it should not be given to the public, as our own meetings are public.

" Q. Will you please state what you found in bovine tuberculosis as being communicated to man? A. I have found in a set of cultures of tubercle bacilli, that is isolated human sputum, and in the disease in cattle that there were certain differences that could be easily recognized by laboratory methods. This comparison is still going on and at present I take the same position I did several years ago that there are certain differences which do exist and do not change.

"Q. Have you found tubercle bacilli in man and bovine identical in any instance? A. Not thus far. The strength of the position I have taken depends largely on the number of different cases examined. The number of cultures which I have studied are necessarily limited because it takes much time.

"Q. You spoke of a case in Berlin, another investigator who has studied the question. A. He found one culture from a case of tuberculosis in the human being which seemed to be the same as that from cattle. It is the first time that the inference was led to that a case of human tuberculosis had risen from bovine.

We have thus one culture out of 35 or 36 cultures which is probably bovine in its origin. It is possible that there might be some change in the passage of the bacilli through the human system which is unrecognizable, but its transmission is not in harmony with our present knowledge.

"Q. Do you consider tuberculosis in cattle a great menace to public health? A. I do not unless the inference drawn from my studies are wrong. I think we must accept the evidence we have before us.

"Q. Do you think from experience that the identity of the bacilli could be lost? A. It is probable. It seems to me that the passage of the tubercle baccilli from animal to man is possible, but we are quite in the dark how often it takes place and what are the particular circumstances that may favor or prevent infection from taking place.

"Q. Do you think of anything further? A. The only suggestion I have to make is that this question must be investigated still more and that it will take sometime to arrive at a conclusion. Such studies are expensive and should be supported by the public.

"Q. You believe that these questions are still unsettled? A. I do; but on general principles, I think the danger has been overestimated. I do not believe it wise to take any stand while investigations are still going on which may possibly compel us to change our conclusions. I have simply given you what I believe is the present standpoint of the question."

Most of the work I have done must be regarded as a re-opening of the question which was formerly regarded as settled and closed.

I may say, in conclusion, that we have visited some of the State institutions where large numbers of patients have been kept and have been able to prove to a certainty that those patients have for 15 or 20 years or more been using milk from cows having tuberculosis to quite an extent, so much so that they were losing cows every little while from the disease and in every institution visited so far, where all the milk was consumed as milk, not as cheese or butter, the percentage of death from human consumption in these institutions has been steadily and constantly on the decrease. The evidence thus far points to the conclusion that Dr. Smith himself has arrived at that bovine tuberculosis is not a great menace to public health and that the danger has been very greatly overestimated, and we know that business has been greatly injured thereby for dairymen.

On the question of quarantine, in the past two years a bill has been introduced in the Assembly of the State of New York placing a quarantine on animals brought into this State, especially dairy cows; that they shall pass the tuberculin test. Last winter I was favorable to that law. Canada has such a law. The western States have such a law. Pennsylvania has such a law and New Jersey. We are, therefore, surrounded by States and countries that require a tuberculin test to be administered to all dairy cows brought into those States. During this investigation we have met with some difficulties and I now feel compelled to stand personally against such a law. I know it is a very popular thing to say that this State shall not be made the dumping ground for cattle from other States. We find however that such a law has not been a success in other States and if it is not so where it is tried, why should we be put to the enormous expense of carrying out and administering such a law in this State. One difficulty is that if the cow has tuberculin injected into her, say three times within three weeks, the third time she will not respond to the test. She would respond the first time, and possibly the next and sometimes not, but in the lowest degree, and the third time, in almost every instance, there would be no response. If a man wants to get a bill of health from the authorities for his cows all he has to do is to inject tuberculin into his cows a couple of times and when the examination is made he gets a clean bill of health. In some States it has become a great source of blackmail. There is also a difficulty about discriminating between beef cattle and the dairy animals and the breeding animal. The cattle that are loaded and reloaded are often not in a condition for the test until after several days, because the object should be to get a fair test of the animal in normal condition. Dr. Peters of Massachusetts said that he did not think it was possible to get a reliable test under the circumstances. The testimony generally is that the test cannot be made a reliable one. To hold the cattle for a week to get a reliable test is not possible. It seems to me the better way to deal with this question would be to examine the cattle perhaps six or eight months beforehand while they are in the hands of the owner. I think that would be a better thing to try at least. The evidence we have taken covers nearly a thousand pages. We report February 1st. I shall earnestly hope to have your support if the measure we propose meets with your approval, in my efforts to bring it to the Governor of the State.

THE PRODUCTION OF GOOD COWS.

By E. G. KNIGHT, Chicago, Ill.

Turn in any direction you may among the farmers who keep cows and you will be amazed, if you get at the truth, at the vast number of poor unprofitable ones that are kept.

Every attempt at investigation in the way of a cow census, that has been taken, proves the truth of this assertion. Every farmer that I know, and I know of many who have undertaken a herd test of their cows, has found to his great surprise from 15 to 30 per cent. of his cows were losing money for him every day. All the evidence I have been able to obtain as the editor of a dairy paper, and a special investigator along this line, leads me insistably to the conclusion that fully one-third of the cows of the country are kept at a loss. Go to any patron of a cheese factory or creamery, take his yearly milk account and figure up pasture at $5 per cow, the hay and what grain they eat, the cost of labor devoted to the production of their food and care, a moderate interest on the capital invested and you will see at once that I am right. When the price of butter averaged for the year at from 25 to 30 cents a pound, the dairy farmers did not realize the force of this poor-cow question as they do to-day, but it don't seem to me that they realize it even to-day. Why don't they realize it? Because they do not believe what is told them on this point. They think they are doing fairly well. Each man makes the mistake of measuring himself by his neighbors. He will tell you he is doing as well as they are. That seems to satisfy him. The only way such men can make a profit out of their cows is for them to deny themselves, their wives and children all indulgence, and thus starve it out.

Let us look at some of the causes which lie at the bottom of this state of affairs. As I see them, they follow in about this order:

(1) A lack of judgment as to what a good cow should do.
(2) A lack of good feeding judgment.
(3) A lack of good breeding judgment.

I know of hundreds of men who have found that they were deficient in the foregoing qualities, and they have set to work vigorously to put good judgment in place of poor. There is a better way of doing with a good deal more money in it. Let every farmer who is keeping cows for dairy work get rid of the notion that a general purpose cow is the most profitable kind of a cow for him to keep. It is not true, and he ought to see it. What kind of a cow is he now keeping? Was she not bred by general purpose men from general purpose sources? Are you satisfied with your returns? If not, how much longer can you afford to wait before you make the right move? I have a chance to know something of both sides of this question. Before me at home are hundreds of men who once were general-purpose men with that kind of cows. They have been pursuaded to breed in more dairy blood. Some of them have selected Ayrshire, some Holstein, some Jersey, some Guernsey. In every instance that I know the grade heifers are a marked improvement on the old general purpose mothers. In some instances the increase of product per cow has been great. Several herds that 10 years ago did not yield over 150 pounds of butter per cow, to-day are yielding from 275 to over 300 pounds annually. The only way to produce a good dairy cow is to breed her from dairy lines.

One great mistake made everywhere is in thinking feed has more to do with a cow's capacity for profit than breed. That is not true. Here is a bale of hay. On one side is a mutton sheep. on the other side a Merino; on the other side a dairy cow, and on the other a beef cow. Each eat of the same food, but by virtue of their breed characteristics, each conveys it into a different channel, and it results in a different product. Does it not stand to reason that if you are after butter, the dairy machine will manufacture it from the same food and with the same amount of it, much more economically than the beef machine? Well, what are you after but butter when you keep cows for that purpose? So many lose sight of the difference in the economy of production in different breeds of cows. They seem to be just as contented to get a pound of butter from a cow that makes it cost 20 cents as from one when the cost is only 10 cents.

What we call breed is nothing more than a marked individuality in some direction, established by long years of breeding, so it will reproduce after its kind. A butter individuality in remote ancestors has finally been fixed, and established into a breed individuality. If you are after butter with its highest economy of production you must breed for it. If you breed for it with the highest economy to yourself, you must draw from those foundations of heredity which we call the dairy breeds. Men will entertain loose notions in this respect for years and try and steer themselves by them to their constant hurt. To illustrate: Did you ever know of a man taking a herd of native cows and grading them up by general-purpose sires, the Shorthorn, for instance, so that the grand-daughters in eight years would average from 150 to 200 pounds of butter more per year than their grandmothers? I confess to you that I never knew of such an instance. Yet I am surrounded I might say with herds that have done that very thing. Had they bred along in the old line, do you think they would have had such revenue-producing machines to do business with as they now possess?

If I could get the farmer who is groaning for more revenue to see some of these things, see where he is beating himself in the face with his own hands by refusing to grade up his cattle for true dairy work, I would have greater hope of his prosperity.

This breed question, and the question of increasing the capacity of the cow in order to put more revenue in the pocket of the farmers, is of greater importance to-day than ever.

When the prices of butter and cheese were high, you might possibly pull through with a rather poor cow. You could at least get a fair price for the fodder by selling it to her. But now prices are low, and no prospect of being much higher. We must have better cows. We must know more about these things. Coarse crude ideas, and coarse cows would once do after a fashion, but they will not do to-day. *In order to make any profit, we must produce the same milk and butter with one cow that we formerly produced with two cows and make the profit of saving the cost of keep of the second cow.*

This is not a newspaper man's theory. It is the hardest kind of business sense; common sense, dairy sense. That is the standard all real wide-awake dairy farmers are setting up for themselves. *The same product with less cows.* To do this, you must breed for it, read for it, feed for it.

WHAT SHALL SHE BE?

An agricultural exchange, in a most excellent article on "The Dairy Cow," says: "The dairy cow is not a matter of breed entirely. There are a great many cows belonging to recognized milking breeds that are very indifferent performers at the pail." This is all true, but it does not state as much of the truth as should be stated. Suppose we said that the trotting quality in horses is not a matter of breed entirely, because a great many trotting horses are poor performers on the track; or the egg-laying quality of hens is not a question of breed entirely, because there are many failures among those breeds noted for their egg-laying qualities. Would that interfere with the broad operation of the acknowledged principle that if we breed for trotters we must use sires of acknowledged trotting breeds; if we breed for eggs we must use males of the right breed? So with cows.

When we speak of a *good* cow there are two things involved First, her capacity as a profitable milk producer. Second, her power within herself, when properly mated, to produce another cow of equal or superior merit. We say, "When properly mated." That brings up another line of knowledge and judgment. It supposes that we have a clear conception of what dairy functions are and how they are transmitted; that we know the breeds of cattle which have had established in them strong dairy heredity; that we have as clear a judgment of the value of dairy pedigree as we have of a clear title to land when we buy a farm. You hear men say: "I don't care anything for pedigree; what I look after is the performance." This is a shallow statement. Suppose a man about to buy a farm should say, "I don't care anything about title, what I look at is the lay of the land." Such a policy will bring him disappointment and loss.

How can you or I judge of the breeding power of a male except by a pedigree, which is a record of what lies behind him? If this is coupled with good external indications so much the better, *provided* we are good judges of such external indications. There are hosts of men who have a most wretched judgment of the outline of a milk-breeding bull. I have repeatedly seen them go into a herd of Shorthorn cattle and say to the breeder: "I want a bull of a good milking strain," and then pick out one of the most decidedly beefy type in the herd. They carried the beef form in their mind all the time and they called it "milking strain." A writer in a Chicago paper not long since described a Holstein bull calf as being "a handsome *square-ended, milky* looking animal." The "milky look" or the indication of dairy heredity and prepotency is not of the "*square-ended*" type.

One reason why we have such a host of poor cows in the country to-day is because the farmers who bred them had no clear, intelligent idea of what they would do or how to do it. The average cow, with her 125 pounds of butter annually, represents truthfully and unequivocally just what was the breeding knowledge and ideal of the man who produced her. He may be intelligent enough on horses, dogs, hogs and politics, but in cow production he is a failure. He is a failure and his cows are a disappointment just because he don't believe in the immutable principles of sound dairy breeding.

It is simply amazing that in the full blaze of the light and knowledge of these closing days of the nineteenth century there are such farmers, and it is still more amazing that there are so many of them.

Such incongruous ideas of beef and milk breeding reminds me of the pickle an editor of a Nevada newspaper found himself in as the result of his getting the report of a cattle show and a concert mixed up.

The spicy article in question, when in his paper, read: "The concert given by six Carson Sink Lake's most beautiful young ladies was highly appreciated. They sang in a most charming manner, winning the plaudits of the audience, who pronounced them the finest herd of Shorthorns in the country. A few are of a rich brown color, but the majority are spotted white and brown. Several of the heifers are able-bodied, clean-limbed animals and promise to be good milkers."

What a blunder that was of the types! No doubt the editor was deeply pained and mortified at its occurrence. But bad as it was, it does not compare with those men who pretend to be dairymen and who are mixing up their ideas of the dairy cows in such a way as to prevent success or profit.

I am drawing these conclusions not from theory but from the record and cash results which flow from these two sets of ideas. For instance, when you see the man with special-purpose cows making double the profit that men do with general-purpose cows, you cannot resist the conclusion such results teach. It is time dairy farmers quit wasting their labor and life on a delusion and snare.

The dairy cow is an enlarged mother, having the functions of maternity developed in a large degree. Here lies the basis of her power, the starting point of her difference in function from the beef cow. This highly developed maternity produces certain signs of its existence, one being the "pelvic arch." Nearly all the notable dairy cows in all breeds show this development, thus contradicting the dictum of "a straight back from the horns to the setting on of the tail."

When the Shorthorn breeders, who were about the first to give to the world a scale of points for the judging of cattle, established the outline of their judgment they were governed mainly in their ideas of conformation by meat production. The world had not thought as deeply then on the physiology of milk production as it has since; so they said a good cow must have a straight back, when, in that day even, the most pronounced dairy cows did not have such backs. Go into any herd in the land and pick out the heaviest milkers, the best butter cows, and you will almost invariably see them with a ewe neck, the backbone rising high at the point of the shoulders, sinking again at the center of the back and rising from the hips in a high, strong ridge to the setting on of the tail. This rise we call the pelvic arch. I admit that every cow ought to have just such a back as they have described if she is going into the business of depositing a heavy loin on each side of it.

But it happens that the dairy cow is not in that business. We don't want her in it.

PROGRESSIVE DAIRY FARMING.

Prof. E. B. Voorhees, Director New Jersey Experiment Station.

Mr. Chairman, Ladies and Gentlemen: It gives me pleasure to appear before this association, though I meet with considerable embarrassment for two reasons, first, because I come from the little State of New Jersey to the great State of New York, and, second, because I come as a young dairyman before the veteran dairymen of New York. And yet, I think, because we are a little State we are obliged to look after little things a little more carefully than you do in this great Empire State, and for that reason the little things which I may have to bring before you may be of importance to you. Although I have been a dairyman but three years, I have been so situated that in all our dairy practice I have been able to keep actual and accurate records of all that has been done, and therefore I have a good deal of data which it seems to me is of importance to every practical dairyman.

Now, in this matter of progressive dairying we may have to consider, first, what is meant by progress. The idea that most people have of progress is somehow or other to join it or connect it with profit. That is, we believe when a man is making money he is making progress. That is true in most industrial lines. It is true in dairying to some extent, yet there may be such a broad combination of circumstances as to make dairying profitable and yet unprogressive. In the next place I wish to call your attention to the fact that the subject is progressive dairy farming,—not progressive dairying. And in my judgment, that covers a great deal of ground. Dairy farming, in the true sense, means a progress all along the line. It is not progress in raising the crop alone. It is not progress in feeding animals, or progress in caring for the animal or the product, but it is progress from the beginning to the end, and it not only affects the producer, but it affects the consumer also. That is, this matter of dairy farming is a business which is not a class business. It is a business which touches not only the man who produces, but it touches the man who consumes. That dairy farmer who does not take into consideration the man who consumes his product has not yet gotten hold of the true idea of dairy farming. Many of us in the past believed that all experience bore out the idea that we must stop when we have produced the price. This is a great mistake as I hope to show before I have finished.

In the next place we must remember that dairy farming is a business. It is a manufacturing business and it is a very complicated business, much more than the mere manufacturing of a material itself. We must therefore apply business principles from the beginning of the caring for the crop until the material that we manufacture, whether it be milk or butter or cheese, is in the hands of the consumer. We must apply those principles and we must adopt those lines of practice which are adopted in all successful lines of manufacture. In the matter of the dairy business as compared with other business, we find that there are several like things we have to take care of. First, the cost of production; second, the improvement of the quality of the product we make. Those two principles are the ones upon which progress is based in all other lines of business, reducing the cost while at the same time increasing the quality of the product. Too many dairymen think that the whole thing that rests upon them is to reduce the cost of the product, that they have but very little interest in improving or changing the value of the product after it leaves their hand, or the price that they receive for it, and yet they do have a very important interest in determining that one thing, not directly perhaps in all cases, but truly so as has been demonstrated again and again.

In the matter of the cost of production, we have to consider at least four lines. First, we decrease the cost of production of our manufactured product by the state of knowledge of how to raise the crops we need. In the second place, we decrease the cost of production by the handling and feeding of those crops. In the third place, we reduce the cost of production by manipulating the wastes that we involved in the manufacturing process.

Let us look at the matter of production of food. We have made great progress along that line. Dairying is not what it was 25 years ago. Then the highest object was to have the animal well fed during the summer when natural conditions were favorable for the production of a kind of food which was well adapted for the purpose. At the present time it is not only a question of raising milk in the summer time, but it is a question of raising milk 365 days in the year, and the natural conditions, favorable in the summer, are not the conditions of winter. We have to study the question of production of crops that shall be the most useful throughout the whole year, so we have to meet that question at once. This question is a complicated one. The farmer puts together the elements of the atmosphere and soil in a crop. It makes all the difference in the world what kinds of crops he compounds those elements into. So, in our own work we have made careful study along that line, as to the kind of material that is best adapted for the animal during that period when she has to be kept in the barn. We want the best food then. We find there are two distinct classes of crops for the purpose. First, the cereal crop, and, second, a class belonging to the legume group. There is no one crop that the farmer can raise that is so well adapted for the conditions that obtain in the winter for feeding as the great corn crop. More food can be obtained per acre and a better kind of food, if properly used, they tell us, than any other kind we can raise. Therefore our purpose should be to raise as large an area of that crop as possible. Corn crop, of the cereals, leads as a dairy food. Now of the legumes; we find that clover is the leading one. It not only gives us a large yield of a very superior kind of food, but it is a crop that can be grown pretty generally. Corn produces more of the dry material; then we should produce some of the crops that contain more of the protein, more of the nitrogenous matter than is possible to corn. We find crops like alfalfa which can be raised cheaply contribute very materially to the reduction of a quart of milk.

I have a few figures here which will give you some idea as to the comparative yield and value as well as cost of materials from those two classes of crops. Take *oats and peas* for example, that is a mixture which can be grown very successfully in this section of New York and perhaps throughout the entire State. Now, that crop is useful not only for summer feeding, but when cured in proper shape is a very valuable and useful food during the winter and it adds to our list an article which we must otherwise purchase in a concentrated food. Careful experiments have shown that the dry matter in a ton of oats and peas costs us $6.30, and the dry matter in a ton of wheat bran would cost us about $19 per ton. Assuming about the average percentage of moisture and that the oats and peas contain 12 per cent. more protein in a ton than is contained in a ton of wheat bran, it is possible for us to raise a food in a material like oats and peas cheaper than we can purchase it in the wheat bran at the prevailing prices. That is a food which we have found more than any other contributes not only to the feeding of the dairy cow in summer, but is a food which can be used to a very great advantage in winter in supplying the protein that is now purchased. We cannot purchase the protein as protein, but we have to purchase some other material with it. Assuming that we are raising protein when we are raising oats and peas, then for one dollar we can secure 54.71 pounds of dry matter. We can raise protein in the form of oats and peas cheaper than we can purchase it in the form of wheat bran. That is one of the points I wish to emphasize as eminently adapted, and one which you can use to very great advantage.

Alfalfa is another crop which contributes very materially to the reduction of the cost of our material. Your State has done some work along that line and it has simply been verified in our own State. It is one of the best crops we can raise as a source of protein, and when it is properly seeded and properly managed it can be grown very successfully in our State and very successfully in the State of New York. Let us consider it a moment in reference to its capacity to supply this element of protein. In our State we find that an acre of land, say, would supply us with 875 pounds of protein, three times as much as any other crop that you compare with it, and twice as much as any other leguminous crop. Those results have been verified in our own State. We can in that way raise more protein per acre than with any other crop we can grow, and there is no crop so suitable for all purposes in the dairy as alfalfa. The past year, with the second year of seeding, we obtained from one crop 20 to 26 tons which contains as much protein as we would purchase in six tons of wheat bran, and which at present prices would cost us $108. That protein in the alfalfa serves the purpose in the dairy quite as well as that which you obtain in the wheat bran. It is along these lines that we are going to reduce the cost of production. We did not keep close record of the cost this year, but the alfalfa cost us nothing but the harvesting of the crop, four different times of cutting and yet we obtained equivalent to $108 purchased in wheat bran, and the crop is there and will continue to do good work for several years to come.

It is important in this dairy business that we should consider very carefully the kind of our raw material as well as its cost. If we are going to manufacture milk out of the various kinds of food then we have to consider the cost of the elements that make up that food and whether we can afford to buy or whether it will pay us better to raise it. A very careful study of these foods I have mentioned is worthy the attention of every farmer and dairyman.

In the next place, a thing that is not considered as much as it should be, is the means that enter into the manufacture of the new milk. We have not in the past given as much care as we should to the care of the animal that produces the milk, in regard to both quantity and kind and with reference to the product we desire to make from it. We have kept very careful record for four years of the animals in our barn. Of course, you have heard this again and again, yet I wish to emphasize it somewhat as one of the elements in reducing the cost of production. We have two cows standing side by side, practically the same weight. One produced last year 12,000 pounds of milk; the other produced 4,500 pounds of milk. Both received raw material worth $40 apiece, in round figures. This cow that produced 12,000 pounds of milk consumed $40 worth of raw material and the cow that gave 4,500 pounds of milk consumed $40 worth of raw material, yet in one case we got nearly three times as much as in the other. What would you think of two machines in a factory with such a difference between them? Such things must be taken into consideration. The cow that gave 12,000 pounds of milk averaged four per cent. of fat. The cow that gave 4,500 pounds of milk averaged six and one-half per cent. of fat. It is not impossible to get cows that will average 7,000, 8,000 or 9,000 pounds of milk with an average of 4.23 per cent. of fat. If we are going to reduce the cost we should study carefully the machines that enter into the manufacture.

Then, we seldom stop to consider the value of the machine. Take these two machines; they both cost $50, and yet one was worth three times as much as the other as a matter of producing milk. Whether our raw material is carbonaceous or nitrogenous it has an influence upon the yield of milk and that fact was illustrated nicely in our own work. It was not possible for us the first year to have a silo. That is a question that would take up a whole afternoon, yet I want to mention a few things along that line. We fed four cows of a certain lot on dry corn fodder and corn meal; we fed another lot some fodder which was in a succulent state; instead of allowing it to dry it was put into a silo; the difference in the yield from those two lots of animals was so very different as to be remarkable as to the results; that is, the yield was very much greater in the one case than in the other. The difference in the dry corn fodder and the ensilage was 34 per cent. In reducing the cost of production you must have the right kind of food in the right state so that it helps the cow to do her best in milk production.

On this matter of a balanced ration I have just a word to say. I wish to give my own experience. It has been demonstrated time and time again that there is a certain proportion of food constituents contained in a ration which is better than any other; but there is another aspect of the matter, when we look at it as a business question. It is an important question when you come to consider the cost of production as related to the cost of food. To increase the protein, we have found every time, increases the milk; but sometimes we can better afford to feed a wider ration of our own materials than to purchase materials at higher prices which are better. If we are in the business to make milk at the least cost the conditions are such at times as to make it cheaper to put in more of the carbonaceous materials than we know is best for the best yield. It is a question of business which we should consider very carefully. We have studied out a wider ration than we used last winter, but the cost is less and the yield is still satisfactory. It is 30 pounds of ensilage, four pounds of dry brewers' grain, two pounds of corn meal and, I think, a pound and a half of cottonseed meal. It gives us a food of about 1 to 7.

Now as to the waste products: A well fed cow we find produces in a year 107 pounds of nitrogen and 87 pounds of phosphoric acid and about 87 pounds of potash. I am satisfied that most farmers are now able to get as much out of that 107 pounds of nitrogen as from that they purchase. It is worth as much to them, and it should and does contribute to the production of raw material. If it does not do so, it is because it is not handled properly or it is not used properly. We have made some experiments on this line. We allowed the manure to leach in the winter and out of 107 pounds, found we had in three months lost 44 pounds in the process of leaching, and the best portion of nitrogen also went out in the leaching process. In order to show the relative increase in the crop which we might expect by applying the waste product in its original state, as compared with its leached state, we applied both corn and oats. Upon corn the fresh manure increased the yield 59.4, 20 tons per acre; upon corn, the leached manure increased the yield 36 per cent. On oats, the increase was 229 per cent. from the use of the fresh manure; the leached manure, 92 per cent. We lost the nitrogen itself in the leaching process. The matter is an important one to consider. We should apply the manure fresh and as fast as it is made, as the preferable way. This matter of leaching is not so bad where the temperature is not high enough to cause fermentation; but it all has a bearing upon the cost of producing the milk.

I maintain that in milk, butter and cheese dairying the farmer should not feel that his responsibility has ceased until his product has reached the hands of the consumer; any improvement he makes in quality will increase not only the consumption, but will increase the price received for the product. Not only is it possible to reduce the cost of production, but it is possible at the same time to increase the result in the market, and consumers will be found at higher prices. We have found it exemplified in the case of the dairy farm which is now in my hands since the spring of 1896. It was then an ordinary farm with an ordinary lot of cows. Everything about the place is kept clean. As soon as we introduced the system of storing the milk in a cool, clean place there was an increased demand for the milk. We asked no person to take a quart and did no advertising. In the past six months our sales increased 1,086 quarts as compared with the preceding similar number. As far as we are able to tell there is an increased consumption on the part of the old consumers of 15 per cent. It is a matter, if we are able to make the business profitable, of encouraging a larger consumption and getting a higher price. Educate the consumer as to what a good product is and then give it to him.

A Member.—What kind of peas do you use?

Prof. Voorhees.—The Canada field pea; the Golden Vine, I think it is. For seed we used two bushels of oats and two bushels of peas. The oats are sowed after the peas.

Question.—Can they be put in a silo?

Answer.—I suppose they could be, but we think it is not possible to have a separate silo in that case. We have put red and crimson clover in the silo in our State, but it does not come out in as good condition as corn does.

Question.—Does alfalfa do well in the silo?

Answer.—Yes.

Question.—How deep do you put in the peas?

Answer.—About three to three and a half inches. I sowed the alfalfa in the spring after plowing down a crop of corn. We sowed from 25 to 45 pounds. I should not recommend that any one sow less than 40 pounds per acre. I believe the two things upon which success depends is in having sufficient amount of seed and in taking care of it the first six weeks after it comes up. The amount of seed should be more than is usually allowed or recommended by seedsmen. There is no crop as good in the dairy as alfalfa and I think every dairyman should try at least an acre of it.

Question.—In cutting off the weeds do you not cut off the alfalfa?

Answer.—We take our chances on that every time.

A Member.—I find the best time to sow alfalfa is in July, it is better than in the spring. We have no trouble with weeds when it is sowed in July.

President Richardson.—I desire to say that we have with us Hon. Henry E. Alvord of the Dairy Division of the National Department of Agriculture. His name does not appear on the program because we were not advised that it would be possible for him to be here. He has consented to talk to us for a few minutes.

Mr. Alvord.—During the nearly twenty years that I have been a member of this association, it has been my good fortune to attend most of the meetings, and in comparing those that were held a good many years ago, with the last meeting held at Gouverneur, and with this one; comparing this meeting, for example, with the last meeting held in this town, I certainly am pleased to congratulate the association upon its growth and the strength with which it shows itself on these annual occasions.

The business represented by the association is one which appeals especially to the State itself. You happen to be so constituted, so conditioned that the market for a very large portion of your products is found within the borders of your own State, and that is the very best possible kind of a market, but still you are producing a surplus. You must sell some of your product of butter and cheese, at least, to citizens of other States. Since you have a surplus to sell you have got to advertise in some way or other. Now there are two most excellent opportunities for advertising, in the near future, one at the Pan-American Exposition to be held at Buffalo soon, and the other at the International Exposition to be held in Paris even sooner. I came to this convention largely in connection with the dairy interests of the Paris Exposition, the American section of the Paris Exposition. The law of Congress relating to American representation at Paris next year, places the representation of American agriculture in the hands of the United States Department of Agriculture to be directed by the secretary of agriculture, and Mr. Wilson determined that the dairy interests of the United States should be given as permanent a place as possible at Paris next year. The detail of this work having been assigned to me, I have been busying with this matter for several months, and in most States it has been often necessary to deal directly with the dairymen and cheese factory people in order to get the exhibits we want at Paris. It happened in two or three States, New York being one, that the State itself looks after the representation of this industry, so in your State you have a commission specially charged with seeing that the agricultural products and dairy products of your State are well represented at Paris. Hence, my task at Washington becomes comparatively easy, as we find there that your State commission is fully alive to the importance of including the dairy in proper proportion in its contribution to Paris, and it has made special provisions for so doing; but in yours and other States we find such great help coming from the State Dairy Association, as being the immediate representative of the industry and the people engaged therein, that we take the liberty of asking the New York State Paris Commission to co-operate with this association and its officers in looking out for your dairy exhibit at Paris next year. I find this work so well progressed, and in such promising condition, that it is practically useless to do any more except to take care of the contribution of your State at New York city when it is ready, and see that it is properly installed and shown at Paris. All I wish to say in addition, beside thanking you and your officers for this opportunity to give a word of greeting, is that when the products are ready to go from this State to Paris to show the dairy industry of New York, I think you may rely upon the branch of the government of the United States with which I am connected, to take those products carefully to Paris and to exhibit them there in a way that will reflect credit upon the dairy industry of New York State.

President Richardson.—The great enemy of the dairymen of the State of New York is called oleo. If there is any State in this Union that has its foot upon the neck of this monster it is the State of New York.

I have great pleasure in introducing to you Hon. George L. Flanders, first assistant commissioner of agriculture of the State. He will discuss the question of oleo.

ADDRESS OF HON. GEO. L. FLANDERS.

Mr. Chairman, Ladies and Gentlemen: I am aware that it is late, and to attempt to deal with this subject would only tire you more than at present. If you will be patient with me I will be as short as I can under the circumstances. That you may get the history of the case; in 1878 the Legislature of the State of New York recognized the growing trade in oleomargarine, and they passed a law that it should not be sold except it came branded so that the purchaser and consumer might know what he was getting. That law was amended in 1882, and in the fall of 1884 they provided that it should not be sold on our markets as a substitute for butter. The wording of that statute; section 6 of chapter 202 of the Laws of 1884, said, it should not be sold as a substitute or to take the place of butter. Pennsylvania enacted a law almost identical, if not in the same words. There were rumors in the air. Good lawyers had said our law was unconstitutional. Others said it was constitutional. We had not been many days at the work before the question was asked, why do you not make a test case? We said we will make a test case in due process of law. Ultimately we got a line out and brought a test case. It was appealed and went to the court of last resort. The oleomargarine people said the State had no right to prohibit the manufacture and sale of this article to take the place or substitute for butter. In Pennsylvania they had the same question and went to the court of last resort with the same question. In Pennsylvania their law was declared to be unconstitutional. In our State the law was declared constitutional. So that in the two States the same law was decided differently. The doctrine involved was this. Our courts said that if the commodity manufactured was healthy and wholesome, and in no way prejudicial to the purchaser and consumer, that the ban of this law would be upon the commodity no matter how desirable to the consuming public and in the course of time we might find some commodity.

The Pennsylvania courts went to the Supreme Court of the United States and their law was declared constitutional. The

Powel case involved a package made within the State but done up in the original importer's package. The Supreme Court said in that case that no question of commerce between the States was involved. Our Legislature changed the law that year so that it said no oleaginous substitute should be manufactured, sold or offered for sale in the State of New York in imitation or semblance of butter, the product of the dairy. On that law we stand to-day. That law was tested and went to the Court of Appeals and they said, this law is constitutional. We have relied upon that ever since and have been enforcing it and I announce to you that now there is no oleomargarine manufactured in the State of New York and none is sold in the State of New York. In saying that I want you to understand what I say. I do not want to say that there is not a pound in the State of New York, or that there is none either made or sold, but I do say that you are a law-abiding people, yet, I might find among you some little fellow who through inducements held out to him may have sold a few pounds or packages of oleo. When I say it is not made or sold in the State of New York, I mean with such exceptions as that. While I talk to you some man may be drawing in a few tubs in the back door of a store somewhere, but we will catch him if he goes on with his work.

Massachusetts had a law similar to ours. There are several other States where they have similar laws. We have enforced this law for 15 years. Within the past year or year and a half the question has come up on which there are differences of opinion. In order to discuss that question I want to call your attention for a few moments to the difference between a United States statute and a State law. One of the speakers has told you that the cow was simply machinery. I will talk to you of the machinery of government under which we live. We are a government of States united together under one supreme law that was derived from the consent of the governed, and it is supreme in its sphere. Now, how did the United States get the law that it has derived? The States of the Union yielded up a portion of their rights so that that power is derived to and defined in the Constitution as a charter of rights, so that when you want to know what the power of the general government is you turn to this charter of rights to know what is enumerated there in its powers, and if you do not find the power you want to invoke there enumerated you can know that they have no such power to wield. When you want to know what power you have in the State government, the only question you have to ask is, Have we delivered up that power to the national government to exercise? If you have, then you cannot exercise it as a State, and if you have not delivered it up to the national government then you can exercise it as a State. In regard to a State law, you say: Is this for bidden by our State institutions? If not, it is a power yielded up to the national government? In either event you cannot exercise the power within the State.

A few years ago, while enforcing the laws in this State successfully, there were oleo manufactures who came here and started; they have been driven out of Buffalo and from other places. Once there arose litigation over whiskey, in Iowa, I think it was. At all events, the whiskey manufacturer sent whiskey in original importers' packages, and it was sold by their agent in violation of the State law. The agent was arrested and convicted and locked up, and the whiskey dealer got out what is known as a writ of habeas corpus and brought him before the Circuit Court of the United States. They said to the court, This man has been robbed of his liberty under a State law and that State law has been enacted on the subject of a power which has been granted to the United States government, namely, a question of commerce between States and the power to regulate that. The question was litigated and it was decided the State had exceeded its authority. Then we said, What is going to happen the oleo? The case fit that of oleo and original importers' packages. We determined to make a fight, and went to Cohoes where the law was not being enforced. We followed them from house to house. The party who sold here was called an agent of the firm, so that when we made a capture it was an agent of Armour

& Company. We went into the house and took a sample and took a duplicate sample and convicted them under the State law. We did not lock him up, but we got an injunction in the State court enjoining him from proceeding, and when he did so we had him punished for contempt of court. That procedure the United States court could not interfere with. In regard to the whiskey matter the people went to Congress and asked that a law be passed prohibiting the sale in the original importers' package. The Supreme Court said that law was constitutional. The defense said that the law was unconstitutional, for the reason that the power to regulate commerce between the States is delegated to the national government. The Congress has no right again to delegate its power to the State. The Supreme Court said that was not so. The law was constitutional. So that now, no whiskey can now be carried from one State to another in the original importers' package in defiance of a State law.

I am glad this convention has passed a resolution asking Congress to do that same thing in regard to oleo. That is just what we want for protection in this State. There is another thing. Over in Illinois they are fighting the same fight. They made an arrest and the case went to the Supreme Court. On the subject of police powers of a State, those powers are held to be inherent to the State. It passes laws to protect the morals and the health of the people, so that what is known as a police law may be passed if it be for that purpose, and incidentally regulates commerce; its prime object is for the purpose stated. If that law is shown, however, to be merely a law to regulate commerce under the guise of a police law, it would be declared unconstitutional. They said in that case, the law was constitutional.

To show you on what small points a case will turn: We contended in one case when they argued that the goods in the original importers' package had been once taxed by law of Congress, that the article sold was not identical with the articles taxed. The witness was asked: Is not oleo that is colored as much oleo as is butter that is colored. We objected to the witness as incompetent and immaterial; when we got through arguing the witness said, in reply to the question, No. Do you know why? Because, he said, butter when it is colored is still butter, oleo when it is colored is to all intents and purposes butter. It was a small point, but on some of these small points rests the fulcrum that turns the whole scale. I will call attention also to the fact that upon the same state of facts, opposite decisions have been given by the courts of Massachusetts and New York State.

COMMITTEES.

Membership.—A. R. Eastman, Waterville; George H. Hyde; H. E. Cook; A. Chase Thompson; J. B. Rice.

Resolutions.—Prof. H. H. Wing; F. J. H. Kracke; H. P. Grant; Jared Van Wagenen, Jr.; W. E. Dana.

Nominations.—Prof. W. H. Jordan; Hon. D. P. Witter; R. P. Grant; William H. Duckworth; H. E. Cook.

RESOLUTIONS ADOPTED.

Resolved, That the New York State Dairymen's Association in twenty-third annual convention, congratulates the butter producers of the nation on the marked improvement in the demand and prices for our products, due not a little to the vigorous interest awakened by these annual gatherings whose precepts are rapidly becoming the practices of the State and nation, enabling them to place within the reach of every citizen a table luxury whose palatability, honesty and purity are above question.

Resolved, That as dairymen and breeders we fully appreciate the work of the assembly committee known as the Witter Committee, appointed to investigate tuberculosis and other animal diseases, and we commend the manner in which this work has been performed; and

WHEREAS, The evidence thus far presented does not conclusively show that bovine tuberculosis constitutes a menace to public health, and that it is a question of animal economics rather than public hygiene, therefore be it

Resolved, That we respectfully petition the Legislature to remove the control of bovine tuberculosis from the State Board of

Health and to vest it in the State Department of Agriculure, or such sub-bureau as may be determined upon, and be it further

Resolved, That we respectfully petition the Legislature to enact such laws, with suitable provisions for their execution as shall serve to better protect the herds of the State from the spread of infectious diseases.

Resolved, that we, the members of the New York State Dairymen's Association in session assembled, in Cortland, N. Y., on the 15th day of December, 1899, hereby respectfully request the Congress of United States to pass a law and provide for its enforcement to the effect that when any dairy or food products are transported from one State to another, or from any territory to a State, that such goods shall immediately become subject to the laws of that State to the same extent and manner as though they had been manufactured in that State, and shall not be exempt from the provisions of such State law by virtue of the fact that they were brought into the States in the original importer's package.

Resolved, That we hereby respectfully request the Congress of United States to pass a law and provide for its enforcement to the effect that any dairy or food products manufactured or sold or exposed for sale in the United States shall not be falsely branded or labeled as to the State in which they were made or produced.

QUESTION BOX.

What is the value of oat chop or the oat feeds as a dairy ration?

Dr. Jordan.—It depends on what is meant by oat feed. I will try and answer that question in my address to-night. I think perhaps I had better not make my speech now.

What is your opinion of the Five States' Association?

Mr. Eastman.—I have but very little knowledge or information as regards that association. I never had anything to do with the working part. Organization is power and I believe the farmers should organize, and I believe the farmers who have paid their dollar the past year in that association have got a great deal bigger interest than the Dutchman's one per cent.

H. E. Cook.—The people of Cortland know that I am the secretary of that association, and as Mr. Eastman has well said, in organization lies the strength of the farmer and farming interests. We have never seen any great work but it was subjected to criticism and some of the leaders were called cranks. The association is more alive to-day than it has ever been in the past. The dealers have paid us more for our milk during the months of November and December, as our members all know, than they otherwise would have paid. I assure you that the milk in New York would drop one-half a cent a quart within the next two days if it were not for these efforts. Success is going to be ours, gentlemen, sooner or later.

A man with limited means desires to improve his breed of cows. Which is best, to buy a Thoroughbred sire first, or buy high-grade calves or buy a small number of high-grade cows?

H. E. Cook.—Of course that subject is a very broad one. I should say, in a word, the best thing he could do would be to buy a full-blood sire if his means would warrant. I should say, in the second place, buy some full-blood youngsters.

Mr. Van Alstyne.—Mr. Cook has said, buy a full-blood sire. I am not in a position to criticize him. There is a rock a great many young men have stranded on. They have an idea of full blood and not individual merit. He may buy without looking for a single point of excellence. He cannot afford that. He wants to buy, above all things, a sire that has an individual record with it.

W. E. Dana.—Get it out of a good dam.

Mr. Sisson.—I fully agree with the last statement. I would prefer a sire in whose ancestry there were a good number of first-class cows and then you make no mistake in breeding cows.

Mr. Conway.—In which way can we produce results most quickly?

Mr. Van Alstyne.—Through the youngster, I think. I am looking at the matter from the economic standpoint.

What ought gluten feed to be bought for and where can it be obtained?

Answer.—The price has been changing somewhat. It can be bought direct of the Glucose Refining Company of Chicago.

What is the remedy for club-foot in cattle?

No answer given.

What is the cause of abortion in cattle and is there a preventive?

Answer.—The causes are manifold. I could give an opinion. It comes from an injury and then it goes through a herd, as many of us know to our sorrow. When you come to a preventive, that there is any sure cure for it I question very much. Sporadic or contagious abortion is very often seen. I have thought, in my own case, that foods lacking in bone-making material had a tendency to cause it. When I fed bran, oat feeds and clover hay, I have thought that had a tendency to lessen it. I believe that the removal of the horns is a very good way to prevent it. I had less of it in my herd since I took the horns off.

Mr. Smith.—I heard a professor at the Dairy Union say that he could prevent it by a hypodermic injection of a preparation made for him by a veterinarian. He had stopped it in some cases.

Mr. Shattuck.—I bought a preventive and set it away in the corn house and never opened it, and have never had a case of abortion since. (Laughter.)

Can you get a balanced ration from the following foods: Corn ensilage, mixed clover and timothy hay, gluten and wheat bran, for milch cow?

Mr. Cook.—It is partly guess work to answer that. I should say that perhaps forty pounds of ensilage, perhaps less or more—it depends on the cow; eight or ten pounds of clover or mixed hay, perhaps four or five pounds of gluten and bran. That may be a little narrow. The tendency would be to contain too much of the protein. If so I would put in a little more of the oatmeal. I think that answers the question as near as I could do so without figuring on it. A nutritive ratio of about one to five would be a very fair ratio.

A Member.—Last year I fed gluten and bran, half and half. I fed one-third gluten, three-fourths corn meal and one-third bran with ensilage or clover hay. I figured on what it cost me. I think as to its practical effect we are figuring practically on the same thing.

Is a college education of a financial value advantageous to a farmer; and if not, from a broader standpoint, why not?

Dr. Jordan.—The question is placed on a very narrow ground. Is a college education of financial advantage to a farmer? That is making the farmer of less value than his money. The fact is, he is a good deal bigger than his money, and if it is an advantage to him as a man it does not make a whit's difference whether it is a financial advantage or not. (Applause.) Yes. Anything that trains a man's judgment, that gives him a keener insight into things, providing a college education does not spoil him in the process, is an advantage to him as a farmer, and a college education is not to-day spoiling men.

Is lime beneficial to other crops than clover on acid soil? Would it be well to mix it with commercial fertilizer? Is it all right to put it in the cow drops or trench?

George A. Smith.—If the soil is acid the sweetening of the soil would be a benefit. Put it on the land and not put on the fertilizer.

How can one ventilate an old-fashioned stable not a basement.

Mr. Flanders.—I think it would depend very largely upon what the stable is.

Mr. Cook.—I can sympathize with this gentleman because in our early experience with stables we had ventilation to sell. I am frank to say that I believe there is no question that affects the New York State dairyman and his milk product more than this one of ventilation. We began some years go to tighten up the barn and batten the cracks. We used building paper and matched lumber, and found out it was cheaper to warm the old cow with hemlock lumber than with corn meal. There is not much difference in the product this year. The more we batten the cracks the more we keep the impure air inside. There have been many questions in regard to stable-flavored milk this year. I believe the answer is that we need better ventilation. I think Professor King of Wisconsin, has given us the finest system of ventilation that we have for barns. There is a barn being used in the northern part of the State, by my friend Mr. Sisson, and one at the station of which Dr. Jordan has charge, and I will have it in operation at home. I have it now in a small way, by which the ventilation is most complete. The system is that of taking the air out of the lower part of the barn. Formerly many out buildings have been ventilated by cutting a hole in the upper part of the barn and letting the good warm air out. I should take this gentleman's stable, say it is made for fifteen or twenty cows, and build an out-take perhaps a foot one way and two feet the other, from the lower part of the barn up through the ridge at a point as high as the highest part of the barn. I would not have the ridge of the barn higher than the ventilating shaft, because it will work just as a chimney that smokes when it is built that way. It is not as high as your house and the smoke some mornings comes down. If you have cracks in the floor I question whether it will pay to build ventilating tubes. First, tighten the floor and then have a place to take in the fresh air. Cut a hole anywhere three or four feet from the ceiling on the outside. Take the air in and carry it up. Let it in just under the ceiling.

In that way you will have a ventilation that will take out the foul air.

Mr. Flanders asked some member to explain how it was that the air would rise by this system through the ventilating shaft, and Dr. Jordan explained the principle by illustrations from the system at work at the Experiment Station. He endorsed the King system of ventilation as giving satisfaction in its results under practical tests. It was a case merely of displacement of warm air by colder air.

Is the use of lime a good thing?

Mr. Smith.—Professor Wheeler of Rhode Island has done more work on this line than any one else. He says from 1,500 pounds to 3 tons depending on conditions which the farmer must study out for himself. One of the plans which he says they have found to be good and perhaps the very best, is taking the stone lime and putting it in by scooping out the earth a little and covering about half a barrel at a time with a little earth and allow it to slack and adding a little water if there is not enough moisture in the soil. Then work it into the soil thoroughly.

How much more would you be willing to pay for stone lime than for the cheapest grades.

Mr. Smith.—I would rather have Dr. Jordan answer that.

Dr. Jordan.—You could not afford to pay much more for the slate.

A member.—Some of it is hard.

Dr. Jordan.—That is imperfectly burned.

What is the feeding value of white daisies for milk and butter as compared with other grasses?

Dr. Jordan.—Who put up that question? I think that is an attempt to make trouble for some one. I will have to go into a little bit of personal history to answer that question. On some of the farms where they are in abundance and they have an idea that twenty-year rotation of crops is economical farming, the daisies will always take the place of grass. I speak from observation of several years. If the daisies are cut early enough so that the best of the flower would not fall off, the daisy hay is eaten with relish, and I have fed a lot of it. We were furnishing milk for the city of Portland. I never could see but that with the usual corn rations the daisy hay gave as good results as other feed. Of course daisies are to be deplored, but if you have them you can make them, by the right method, into a fairly available fodder.

How many quarts of corn should one sow per acre for ensilage? Is state or flint corn the better for this purpose?

Mr. Witter.—As to the variety I am not so sure. I believe in any variety that will ripen in the locality, and then the one that has the largest food value in it is the best. We sow about eight quarts to the acre.

How would you furnish ventilation to a refrigerating room?

Professor Wing.—Of course in a refrigerating room we do not have animals so that the question of a change of air is relatively unimportant. The only danger is that the air will be overloaded with moisture. If the ventilating room is in front, usually the opening and shutting of the door will bring about a frequent change of air. If cold storage for long periods of time is called for, then a small pipe taken from near the floor leading through the building out, will let in the air and bring ventilation enough.

Would this be sufficient ventilation to keep cheese in proper condition and keep them from gathering too much mold?

Professor Wing.—I think so. Dr. Jordan can tell you what arrangements they have for ventilating their cheese-curing rooms.

Dr. Jordan.—I wish I could take you and those interested in temperature control into our cheese-curing rooms. I doubt if I could make you understand the mechanism otherwise. We have hot air coming in below and cold air descending into the rooms from above. That is as we wish and it is an automatic temperature control. When the warm air comes in from below that passes out into an open attic room above, so that there is a change of air at the time the warm air is coming in, when the cold air descends from above and there is a circulation of air in the room. I doubt if it is necessary for us to change the air very frequently in the rooms. We have kept the moisture up to seventy-five or eighty. In the coldest rooms there has been some molding on the surface of the cheeses that have stood there for a long time.

Mr. Clark.—A large portion of the moisture, I should say, was carried out with the upper current.

The Experiment Station Cup.

STATEMENTS OF THE COMPETITORS AND METHODS OF MANUFACTURE.

The Experiment Station Cup, offered by Dr. W. H. Jordan for the best butter exhibited at the State Dairymen's Convention at Cortland, was awarded to Mrs. F. E. Dawley of Fayetteville.

A condition of the contest required that a statement, showing method of manufacture, accompany each entry. We give herewith the statements of those scoring highest.

Statement of Mrs. F. E. Dawley.

SCORE 98.

This package of butter was made from the mixed milk of five registered Jersey cows, all which have come fresh within 60 days. They weighed about 900 pounds each, are solid color with black points. They are now kept in the barn all the time, except when turned out about half an hour morning and evening for water. The stables are kept as clean as possible and absorbents used in the gutters. Each cow stands in a full length stall and is confined with a chain about the neck. The cows are carefully groomed so that no dirt can get into the milk at time of milking.

The cows are fed shredded corn ensilage and alfalfa hay for a rough fodder, and are each given about nine pounds of grain, made up of three pounds of wheat bran, two pounds pea meal and two pounds each of gluten and dry brewers' grains. The bran and pea meal are fed dry on the ensilage and the gluten and brewers' grains are soaked before feeding. The ensilage with the meal on it is fed morning and evening, and the hay is given at noon.

The stable is ventilated by a modification of the King system—fresh air being admitted from the sides of the stable and the foul air taken out by four shafts extending into the cupolas. The cows are milked regularly between 5 and 6 o'clock both morning and evening.

This butter is part of that made from three milkings from these five select cows. They gave 318 pounds of milk and made 13 pounds two ounces of butter when salted and ready for market. The milk was carefully aërated as soon as it was drawn from the cow and then run through a De Laval Separator, set to make the cream heavy. The cream was stored in a ventilated cream pail at 50° F. until a sufficient quantity for churning had accumulated and was stirred as opportunity offered with a device like an inverted funnel, with the large end resting on the bottom of the can. This is perforated with half inch holes and by raising and lowering it in the can the cream is thoroughly mixed. When ready for ripening the cream was heated to 80° F. in a hot water bath and ripened in about 12 hours. It was churned into a granular condition in a barrel churn and then washed until free from butter milk in pure water warmed at 58° F. Then it was removed from the churn and salted with one ounce of Genesee salt to each pound of butter. This was thoroughly incorporated with the butter by forking it over, after which the butter was thoroughly worked and packed. I used no starter in the cream because the cows were all fresh, and with the food which they are getting I did not think it necessary, although I should recommend its use when the cows have been in milk a long time and where they are not fed a balanced ration.

MRS. F. E. DAWLEY.

Statement of Henry P. Carll.

SCORE 97½.

This five pounds of butter was made from a herd of 18 A. J. C. C. cows, and they are varying in periods of lactation from two weeks to one year. We try to have an equal number of fresh cows each month except July and August. At the present time we have no more than our usual number of fresh cows. Just now the fodder consists entirely of corn stalks (having not yet opened our silo), served in various ways. The grain ration consists of malt sprouts and gluten feed mixed well together in the proportion of 300 pounds of the former to 200 pounds of the latter. This has been our grain feed for two years and I defy anyone to beat it for the same actual cost as a feed for dairy cows. Of this feed we feed different cows different quantities, 15 pounds being the most we feed any cow, unless feeding for an individual test of butter. From this feed we expect to make as many pounds of butter a day as we are milking cows and frequently do better.

The cows are fastened in stanchions when stabled, of the rigid kind, but they are curried and brushed every day, turned out for exercise every clear day from thirty minutes to three hours, depending entirely on the temperature and wind. The stables are thoroughly cleaned and kept free from vile odors every day in the year. Our system of ventilation is through doors and windows on each side of the stable. So much for the cows and their surroundings, now for the butter.

The five pounds of butter under consideration is a part of the product of two days (40 pounds in all), December 6th and 7th. Four milkings of course in the two days, made at 5 a. m. and 5 p. m.

The cream is separated with a Baby No. 2 DeLaval separator at a temperature of about 100°; then aërated with Hill's milk aërator for about five minutes—the only perfect principle of aërating—and then cooled to 45° as quickly as possible, covered to keep out dust and microbes and kept as near 45° as possible until wanted for ripening. It is then treated to a hot water bath and the temperature raised to 70°, put in a Boyd ripening vat, and a "starter" which has been previously made from skim-milk taken from a cow quite fresh in lactation (but not skimmed when taken from the cow) is added at the rate of 6 per cent. This is thoroughly incorporated with the cream after which the vat is tightly closed and the cream left to ripen for about 24 hours.

the time quite often varying. When thought to be sufficiently ripened it is again cooled to 50° and after a few minutes put in a barrel churn to come to butter. The churning generally takes about 45 minutes. The butter herewith was just 45 minutes churning. As soon as the butter appears in granules the size of turnip seed or thereabouts, a strong brine is added warm enough to bring the whole contents of the churn to 65°, which temperature we try to maintain until the butter is printed. After the brine is added, the churn is revolved a few times and the buttermilk drawn off. The butter is then washed twice in clean water when it will, if handled properly, appear in granules about the size of wheat or peas. It is now ready for the butter worker. Ours is the simplest and best of all—the lever worker. After it is run over once with the lever, Worcester salt is added, one-half ounce to the pound of butter. And now comes what I have found to be the most critical part of the butter-making, to know when it is worked sufficiently to have the salt evenly distributed, the grain of the butter not destroyed and mottles prevented. I generally find six minutes constant working and turning sufficient to work in the salt, work out the mottles and yet have preserved the grain of the butter. After the working, our butter is all printed in a combination butter print and cut in quarter pound cakes; and this after 10 years of use we have come to think leaves the butter in the most beautiful shape for the family table.

At last we come to the final touch of wrapping in parchment paper and packing in paper boxes, like the one on exhibition. And this when wrapped in heavy paper is the neatest, cheapest, cleanest and most convenient, non-returnable package on earth. We have shipped thousands upon thousands pounds butter in this style of package and have never had a complaint, arriving at destination all right.

H. P. CARLL.

Statement of George W. Sisson, Jr.

SCORE 96$\frac{3}{4}$.

This butter was made from the mixed milk of 50 registered Jersey cows in various stages of lactation, about one-third being fresh. There was no selection of milk, nor any change from regular routine in feed, care or manufacture, as the desire was to send a sample of our every-day product.

Housing.—The cows are housed in a stable 40 feet wide by 115 feet long with 10-foot ceilings; cement floors, gutters, mangers and feed alleys; amply lighted with large double-sized windows. Ventilation is provided by 12 fresh air inlets, each 6 x 12 inches, taking outside air at about a foot above the sill and delivering it in the stable nearly at ceiling. Four large, lightly built flues, each with an area of three square feet in the cross section, extend from within a foot of the stable floor to the ridge, where they are topped by galvanized iron ventilators four feet high with a cap. These flues are for removal of foul air. I would add that these are provided with tight doors near ceiling of stable which can be opened in case of too high temperature, and quickly carry off heated air.

Feeding.—The feed is ensilage, mixed hay, with a fair percentage of clover, and a grain ration consisting of one part bran, one part corn meal, one part ground peas and oats (home grown), mixed by weight. Of this grain mixture from two pounds to six pounds is fed to each cow twice a day upon 15 pounds of ensilage immediately after milking. Hay is fed also twice a day after the ensilage and grain are eaten, the object being to give two full feeds daily.

Watering.—The cows are watered in the barn except in pleasant weather, when they go to windmill tank in the yard 10 rods from the stable. When watered in the barn their cement mangers form the water trough. Milking begins regularly at 4 p. m., each milker having his own cows which are always milked in same order; the milk of each cow is recorded and the carrying pails as filled are taken to the dairy house. The sample of butter exhibited is part of that made on December 9, 1899, from the milk of December 6, p. m., December 7, a. m. and p. m., and December 8, a. m., or four milkings.

The dairy house is a substantial building with cellar, 20 x 30 feet, boiler and engine room 13 x 20 at the rear. Steam for heating, power, scalding, etc., is furnished by a 10-horse power boiler. The cream is separated by a DeLaval Baby No. 3 machine operated by engine and belt power; cream is then passed over a Champion cooler, aërating and reducing the temperature to 50°.

Boyd ripening vat of 50-gallon capacity is used in which the cream is then stored. No starter has been used as yet this fall as the temperature is so under the control of the operator that good results have been obtained without. It was found necessary, however, to raise the temperature of the cream to 65° 24 hours before churning, which resulted in a fine, soft, thick, mildly acid cream. This was churned in an oak-barrel churn at a temperature of 58° for 35 minutes, when butter appeared in fine granules; a gallon of cold brine was then added and the churn gently agitated. The buttermilk was drawn off and the butter washed in two waters at 55° and allowed thoroughly to drain in the churn. The granular butter was salted in the churn at the rate of one and one-half ounces of salt to a pound of butter as known by the cream used. The salt was thoroughly but carefully stirred through the granular butter. After allowing to stand a few minutes the engine was started and the butter worked in the churn from three to five minutes. It was removed from the churn and finished on an Eureka butter worker, and packed or printed at once.

We believe absolute cleanliness and control of temperature to be the two great essentials in fine buttermaking.

GEO. W. SISSON, JR.

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Sturtevant, Dr. E. Lewis, S. Framington, Mass.

*Deceased.

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REPORT

OF

DR. ALVAH H. DOTY

ON

DISPOSITION OF GARBAGE.

TRANSMITTED TO THE LEGISLATURE MARCH 5, 1900.

ALBANY:
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STATE OF NEW YORK.

No. 67.

IN ASSEMBLY,

March 5, 1900.

Report of Dr. Alvah H. Doty on Disposition of Garbage.

State of New York—Executive Chamber,
Albany, *March* 5, 1900.

To the Legislature:

I have the honor to forward herewith the report made at my request by Dr. Alvah H. Doty, Health Officer for the Port of New York, on the question of the disposal of garbage and refuse matter of cities and villages, together with accompanying exhibits.

THEODORE ROOSEVELT.

REPORT.

STATE OF NEW YORK,
HEALTH OFFICER'S DEPARTMENT,
QUARANTINE, S. I., *February* 19, 1900.

HON. THEODORE ROOSEVELT, *Executive Chamber, Albany, N. Y.:*

Dear Sir.—In compliance with your request, I have the honor to present the following report on the subject of garbage disposal. In preparing this I have borne in mind the importance of dealing with the matter from a practical standpoint. Therefore in addition to my personal investigation, I have included in the report an expression of opinion on this subject from a large number of experienced sanitarians and engineers both in this country and abroad.

Garbage or refuse is disposed of by municipal authorities in three different ways:

First. By removal to some point beyond the inhabited portion of the town or city and buried, or dumped on the land or into the sea.

Second. By the process known as Reduction or Utilization.

Third. By Incineration.

The method of removing garbage to a point of land beyond the inhabited portion of a town for the purpose of dumping or burial deserves no special consideration as it is not only primitive, but unsanitary, and is only justified when no other means of disposal is available. The same practically applies to dumping garbage into the sea. In regard to the latter

I may add the statement made by Lieut. John C. Fremont, U. S. N., Supervisor of the Harbor, viz, that it would probably be necessary to take the garbage from New York city at least fifty or seventy-five miles to sea in order to prevent its return. This fact alone will show that such a method is not only impracticable but dangerous, and during heavy or foggy weather its removal would be impossible.

UTILIZATION OR REDUCTION PROCESS.

The disposal of garbage by the Utilization or Reduction process is at the present time employed to a considerable extent in this country. The principle of this method is to so treat the garbage that a revenue shall be derived from the products. The process is substantially as follows:

The garbage unmixed with ashes or other refuse is put in large vertical steel tanks, known as digesters, and exposed to steam for six or eight hours at a pressure of 30 to 80 pounds. The mass is then taken from the digesters and placed in gunny sacks, (the texture of which is loose) and subjected to pressure in order to extract the oil. The residue, which is known as tankage, is then removed from the sacks, dried and screened. The screened portion, which consists of a brownish powder, is sold to manufacturers of fertilizers and becomes a constituent of this material. The pieces of bones, etc., removed by screening have also a commercial value. Although the products of the different utilization plants are practically the same, that is, oil and tankage, there is some variance in the construction of the machinery used and the method employed. The reduction of the garbage may be accomplished by steam alone, or in conjunction with naphtha or acid. The method of expressing the oil from the mass taken from the digesters is much less offensive in some plants than in others. Without discussing the possible improvement in this direction, I may say that the utilization or reduction of garbage involves a long process which is more or less offensive and complicated even when extraordinary precautions are taken to prevent it by those who are in charge of the work. In order that the details of this method, as well as that of incineration may be presented to you in full, I have included in my report a description of these processes prepared by those directly interested. (Exhibits A, B and C.) In the proper operation of a utilization plant it is imperative that the garbage should be collected free from ashes, house sweepings, etc. The difficulty of enforcing this is only too well appreciated by municipal officials and also by proprietors of reduction plants whose apparatus is frequently seriously injured by the presence of ashes in the garbage. On the part of the individual citizen the separation referred to requires that he shall have at least two and sometimes three different receptacles, viz: One for garbage, one for ashes and one for other household refuse. This not only involves considerable trouble and expense on the part of the household, but the numerous receptacles are unsightly and in the way.

INCINERATION.

Although the incineration of garbage and other refuse has long been regarded by those who are competent to judge as the proper method of disposing of this material, it has not until the past few years received the consideration which it deserves. This has been largely due to the fact that the earlier methods of incineration were expensive and impracticable. To burn garbage alone containing as it does, particularly during the summer months, 80 to 90 per cent. of water, would not only require an enormous amount of coal, but the generation of a degree of heat which would soon prove disastrous to the apparatus. It is proper however, to add that another factor has also been responsible for the limited investigation in this direction. I refer to the fact that incineration does not yield the revenue which is secured by reduction or utilization and therefore has not been regarded as an economical process for municipal work. During the past few years, however, incineration has so impressed practical engineers and sanitarians with its value that the subject has received special study and investigation and as a result incineration as a means of disposing of garbage and other refuse has passed beyond the experimental stage and now presents itself as a practical and scientific agent for this purpose. This transition from an unpractical method to a practical one is due mainly to a change in the principle of construction whereby a powerful draught is secured. By this method garbage with ashes and house refuse, all of which are inflammable, can be incinerated without the use of coal, except an amount necessary to start the fire. This process at once practically removes the cost of coal, (the most expensive item in the earlier method of incineration) and renders unnecessary the separation of garbage from household ashes and other waste, and so far as I am able to ascertain would reduce the expense of garbage or refuse disposal by incineration to a point where it can be considered from a practical standpoint. For instance the incineration of garbage alone by the original process would probably cost about $1.25 per ton. By the present method of incineration, which is now in use in San Francisco, Montreal, Hamburg, Berlin, Bradford, Leeds, Edinburgh, and other cities, it is claimed that the mixture of garbage, ashes and other household refuse can be incinerated for from 12 to 16 cents per ton. The amount of ashes produced in a large city is enormous; to include this material in the mass removed to the incinerator would of course add greatly to the cost of this process, besides ashes is not a menace to the public health and is frequently taken away by contractors for filling in and other purposes free of cost to the occupant of premises or the municipality. In regard to this I may say that it has been shown that the presence of ashes is not necessary to insure the incineration of garbage in a modern apparatus, provided the house sweepings, etc., are combined with it. Therefore, the whole or part of the ashes may be separately removed or dealt with as the municipal authorities think best.

I have personally investigated the working of the incinerator now used at Hamburg, Germany, and a general description of it will give an idea of the principle involved in all the incinerators now in operation. The incinerator referred to is very simple in its construction and consists of a low square built apparatus of brick and iron, having on top 36 cells or openings covered with close fitting lids. These openings connect with the apartment or individual grates beneath, where the incineration takes place. The refuse consisting of garbage, ashes and sweepings is collected in different parts of the city and brought to the incinerator in wagons, which are so constructed that their boxes can be detached and lifted by a crane and carried to a point directly over one of the cells or openings, the lid of which is then removed and the refuse from the wagon dumped in. While this is being done tin cans, pieces of crockery, etc., which have been mixed with the mass are to a large extent removed. The mass after entering the opening passes through a chute and is carried directly to the grate; the cover of the cell is then replaced and the process of incineration begun. The gases which are formed during the incineration are returned to the grate or fire and destroyed before they can reach the outer air. Neither the small amount of smoke emitted from the chimney nor the general work of the incinerator is regarded as a nuisance, although the apparatus is in the built-up portion of the city. This process as conducted in Hamburg is not without some revenue. The klinker which is raked out from the grate is crushed to different sizes and readily sold. It is mixed with cement and used for the construction of streets. This yields a revenue of about 40,000 marks per year, equivalent to $10,000. Nails and pieces of iron which have become mixed with the refuse are removed by a powerful magnet, which operates as the klinker passes through the crusher. Compared with a reduction plant the machinery used is exceedingly simple and easily operated. It is unnecessary to emphasize the superiority of this process which consists in the simple dumping of refuse into an opening and its immediate destruction by fire compared to one which handles and rehandles the garbage in the original and the changed form, both of which are more or less offensive. I will simply refer to the fact that sanitary engineers both here and abroad regard the steam power which can be generated by the incineration of refuse as of great value to a municipality. It has already been put to practical use. It is reported that one of the English towns now employs the power referred to in furnishing electricity for lighting its streets; this detail of the process of incineration, however, is yet to receive careful investigation.

I have introduced in my report a detailed description and illustration of some of the different incinerators now in use, and would particularly call your attention to the report of F. Andreas Meyer, Chief Engineer of the Building Deputation of Hamburg, and the communications received from the health officials at San Francisco and Montreal, where incinerators are now in use.

In the consideration of the subject of garbage disposal, I believe that it should be viewed chiefly from a sanitary standpoint, in order that we may decide what method is most effective in protecting the public health and comfort. It can hardly be denied that from such a position the disposal of garbage by the utilization or reduction system is improper. It is the utilization of a city's refuse, largely for the purpose of securing a revenue. It is true that this method disposes of the garbage—but this is not of the greatest importance to the contractor. His interest is in the pecuniary benefit which he derives from the product. Although I believe the apparatus now employed in utilization plants have reached a high degree of efficiency, the process is long and complicated and is more or less offensive. Even when great care is employed an odor is produced which no amount of washing or scrubbing can entirely eradicate. These conditions therefore require that a utilization plant should be far away from the built-up portion of a city. This involves the transfer of the garbage to some distant place and seriously interferes with its prompt collection and removal. Both of these conditions, the long complicated and offensive process and the delay in the collection and removal of the garbage to the plant, are violations of a most important sanitary law, i. e., that refuse should be rapidly destroyed as near as possible to the point of production. A strict observance of this law would mean that the garbage should be destroyed in each household as rapidly as it is produced. From both a practical and scientific standpoint I believe that this is the proper solution of the problem of garbage disposal and that sooner or later it will be adopted. I refer to the incineration of garbage in each household, hotel, etc., by some simple apparatus. In order to fully appreciate the relief which this would bring to a community both in comfort and expense, as well as from a sanitary standpoint, it is only necessary to visit a refuse dump or witness a procession of barges carrying garbage as they pass down New York Bay. The importance of following the law to which I have just referred is being appreciated by the civil and military authorities both at home and abroad. As you are aware, during the past two years some interesting experiments in this direction have been made at the New York State Military Camp at Peekskill. Incinerators for the immediate destruction of night soil and other refuse have been devised and used with excellent results.

By the method of incineration no separation of garbage, ashes, rags, etc., is required; however, in the utilization or reduction process rags and other textile fabrics, which are frequently filthy and offensive, must be separated from the garbage at the house and removed separately to dumps where they are usually picked over and sold. Although but little if any reliable evidence exists to show that foreign or domestic rags, such as are used in a commercial way, act as a medium of infection, it is possible that rags or pieces of cloth or garments soiled with discharges may transmit infection if taken directly or within a few hours to a dump and then handled. During an outbreak of certain forms of infectious disease this may prove a menace to the public health; therefore as this danger cannot be anticipated a municipality should not seek a revenue from such a source. In the disposal by incineration this form of refuse is burned with the garbage as it should be. In a utilization plant there is usually a large amount of offensive drainage, which must be disposed of in a liquid form, whereas in cremation there is no residue but the klinker and ash.

Although the disposal of refuse is the essential point, its prompt collection and removal is very important. This indicates the necessity of having a number of disposal stations situated in different portions of a large city in order that the refuse can be promptly collected, removed, and destroyed. For this purpose the division of a city into districts each having its own disposal works would insure a more rapid collection and destruction of refuse and inasmuch as the apparatus for a single plant would be comparatively small, but little land or space would be required for its construction and operation—an important consideration.

As it is intended that this report shall deal with the subject of garbage disposal principally from a sanitary standpoint, I will not introduce an array of figures to show the estimated expense of the different methods which I have already referred to, but will say that although at present the disposal of garbage by utilization or reduction is cheaper than by the process of incineration, the latter is regarded by those who are competent to judge as a practical method of destroying refuse. Incineration is now successfully operated in the large cities already referred to (Hamburg, Berlin, San Francisco, Edinburgh, etc.), and has already received favorable consideration by the sanitary authorities of Paris and other large cities of Europe.

As the result of the investigation which I have made and now report to you, I am satisfied that incineration is the proper method for the disposal of garbage and other refuse, and while I am fully aware of the obstacles which would probably present themselves in the establishment of this method in the city of New York, I believe that a change from the present one is for the public good. It is but just to those in charge of the utilization plant at Barren Island to state that the offensive odors which at times emanate from that place are not by any means produced entirely by the reduction process, which is manipulated with great care, but is largely due to the fact that garbage is removed from New York city in a decomposed condition caused either by delay in collection, or by its detention at the city dock until the garbage scows are fully loaded; both of which are improper and unsanitary. The removal of this material to Barren Island, which is at least twenty miles from New York, is a slow process and occasionally interfered with even during the summer months by certain conditions of the weather. Therefore under the present arrangement it would be difficult for the street cleaning or any other department to comply with proper sanitary regulations regarding the collection and transfer of garbage.

I feel satisfied that the passage of the Barren Island bill, while it suggests nothing in place of the present process, would result in the establishment of a method of garbage disposal for the city of New York which would be far superior to the present one and would comply with modern sanitary requirements.

Respectfully,

A. H. DOTY,

Health Officer, Port of New York.

List of Exhibits.

Exhibit A. Description of utilization or reduction of works (Barren Island.)

" B. Matter relating to Thackeray process of incineration.

" C. Horsefall process of incineration.

" D. Plans suggested for the Disposal of Garbage of Providence, Rhode Island; also Matter relating to Decarie process of incineration.

" E. Matter relating to the Walker process of incineration, Etc.

" F. Communication from F. Andreas Meyer, Chief Engineer Building Department of Hamburg, Germany.

" G. Foreign communications regarding disposal of garbage.

" H. Description of new Berlin crematory.

" I. Communication from health officials in the United States regarding the disposal of garbage.

Exhibit A.

The Barren Island Garbage Reduction Works, Greater New York.

[Extract from Engineering News, February 1, 1900. No illustration.]

It is not generally known that the bulk of the garbage of Greater New York is converted into marketable grease and a fertilizer base by the largest garbage disposal works in the world. This plant has a contract capacity of 1,000 tons a day, and it is claimed that as high as 1,500 tons a day have been treated by it for short intervals during the height of the season. The plant is located at Barren Island, in the Rockaway inlet to Jamaica Bay, remote from centers of population, yet within the limits of New York city (see Fig. 12). The works are practically in duplicate, although now operated as one huge enterprise. This is due to the fact that each of the two great factories was built to fulfill a separate contract, the first made with New York and the second with Brooklyn, prior to their consolidation into Greater New York. The same process is used in both factories, the joint works being operated by the New York Sanitary Utilization Co.

The first contract was executed on June 6, 1896, between the city of New York and the New York Sanitary Utilization Co. It runs five years from August 1, 1896, and is based on an estimated quantity of 500 tons of garbage a day for 313 days in the year. The contract price was $89,990 a year, including the furnishing of scows by the contractor, the reception of the garbage thereon, its transportation to the reduction works and its final disposal in an unobjectionable manner. The contractor is obliged to receive the garbage at dumping places provided by the city on its water front as it then existed, not exceeding 18, unless otherwise agreed. Garbage was defined as meaning the refuse of an organic nature, not including "street sweepings," collected by the carts of the city or by duly authorized private carts and delivered at the dumps or other places of final disposition, and containing not more than 10 per cent by weight of other refuse.

The second contract was made on November 16, 1896, by the then city of Brooklyn and the Brooklyn Sanitary Co., Mr. F. L. Cranford, president. It covers five years from January 1, 1897, and provided that until May 1, 1897, the plant of the New York company might be used. The contract price for the five years aggregated $605,000, or an average of $121,000 a year, divided by years as follows:

First	$113,000
Second	117,000
Third	120,000
Fourth	125,000
Fifth	130,000
Average	121,000

This contract, it should be noted, includes the collection, transportation and final disposal of the garbage of Brooklyn, instead of the last two, only, as in the New York contract. The basis of the bid was $1.25 per ton collected for about 250 tons a day, 365 days in the year, for the first year, with some allowance for subsequent increase. The contract called for a plant with a maximum capacity of 500 tons a day.

Before proceeding to describe the combined plants in detail a few words may be said regarding the disposition of garbage in parts of Greater New York not covered by these two contracts. First, it may be noted that a portion of the old town of Gravesend, well known throughout the country as Coney Island, began to burn its garbage in an Eagle furnace as far back as 1889. The use of this furnace was discontinued about 1896. On July 1, 1895, a Brownlee furnace was put in operation by the then village of New Brighton, Staten Island, now a part of the borough of Richmond. This has been in use most of the time since that date, but was discontinued about November 1, 1899, with the completion of the plant for the whole borough of Richmond, mentioned further on. About the middle of 1896 a furnace designed by Burns was erected by Norton & Gorman for the former towns of Flatbush, New Utrecht and Gravesend, which had recently been annexed to Brooklyn. The amount of garbage from this section, in the summer, proved to be far beyond the anticipations of the contractors, and the furnace was altogether too small to handle it. The furnace was continued in use for a year or so, but was finally abandoned, either on account of the high cost of operation or because of the expiration of the contract.

In March, 1899, bids were received by the Department of Street Cleaning for the reception and final disposition of street sweepings, ashes and garbage in Queens and Richmond boroughs during the balance of 1899 and the whole of 1900. The contract was awarded to Mr. Zephaniah F. Magill, of Troy, N. Y. He agreed to build furnaces of the Brown type, but later secured an amendment to the contract permitting the use of Dixon furnaces. Five of the latter were completed during the last part of 1899, located, respectively, at Long Island City, Flushing, Jamaica, Far Rockaway and West New Brighton. The first four serve Queens and the last one Richmond borough.

The bulk of the ashes, street sweepings and light refuse of Greater New York is now towed out to sea and dumped. The percentage so disposed of varies with the opportunities afforded for depositing on land. In 1899 some 60 per cent of the total went to sea, but in 1895 about 90 per cent was towed and dumped. The length of tow is about 25 miles from the Battery for eight months, and 20 miles for four months in the year. Since 1895 a portion of the dry, light refuse of the city (Manhattan borough), including rags, paper, pasteboard, excelsior, barrels and boxes, and also a miscellaneous collection of junk, has been gathered separately and hauled to a refuse-sorting and burning plant. The first of these was described in our issue of November 21, 1895. Rags, paper and other material of value were picked from an inclined conveyor by men and boys, and the balance went to a Colwell furnace. The heat generated was more than sufficient to operate the plant. This first plant was shut down in 1896, but in May, 1897, a similar plant, also having a Colwell furnace, was put in use on East Eighteenth street. This plant is still in operation, although changes have been made in the furnace. The development of the refuse-sorting idea was carried out quite largely by Mr. Herbert Tate, in conjunction with the late Colonel Waring.

It hardly seems necessary to say that the final investigations resulting in the adoption of the reduction process for the treatment of the garbage of New York were made by Colonel Waring and an able corps of assistants, several of the latter still being in the employ of the Street Cleaning Department. Brooklyn profited by this work, although subsequent to the publication of Colonel Waring's "Report on the Final Disposition of the Wastes of New York" the Health Department of Brooklyn made an independent investigation and report on the same subject, as related to Brooklyn. As is set forth particularly in our editorial columns, investigations in New York previous to those of Colonel Waring had resulted in the recommendation of the reduction process, so, altogether, it is apparent to any one who gives the matter proper attention that neither New York nor Brooklyn rushed blindly into the contracts under which the Barren Island reduction works were built and are being operated.

The Arnold system of garbage reduction, controlled by the American Sanitary Product Co., of Philadelphia, is employed.

The New York plant was put in partial operation in December, 1896, and began to receive garbage from Brooklyn in 1897. The Brooklyn plant was put in use later on in 1897, or early in 1898, at which time the original factory was in need of heavy repairs on account of the unexpected amount of work thrust on it by the two cities.

The garbage is dumped from the carts onto deck scows, five dumps and an average of 14 scows being used under the New York contract and one dump and six scows under the Brooklyn contract. The scows carry an average of 300 tons of garbage, and one tug usually tows two scows. Barren Island is about 25 miles from the Battery by the scow route, and the average length of towage is about 27 miles for the New York and about 18 miles for the Brooklyn contract.

The two garbage reduction plants are very similar in design, but the Brooklyn factory having been built last has some improvements not originally found in the other, although many of them are being introduced as opportunity arises. The line illustrations on the inset sheet are reproduced from the designs for the new or Brooklyn plant. The notes at the works were taken in the old or New York factory, but they have been supplemented from other sources and in a general way, and in most details, relate equally to both plants.

A general plan of the whole works at Barren Island is shown by Fig. 1, and a fair idea of the exterior, from the water, is shown by the large views, Figs. 2 and 3. These views are misleading in that the derricks there shown in place for unloading the garbage are not now in use, having been replaced by short conveyors. The details of the process and plant are given further on, but will be understood better if outlined here, with further references to the illustrations. The green garbage at each factory is taken to the digesters by two main conveyors, shown in Figs. 4 and 5 on the inset sheet, is cooked by steam in 48 digesters, pressed in twelve screw pressers, dried in twelve driers, screened by three screens and finally bagged. The grease and water discharged from the presses is separated, the grease barreled and the water evaporated to "stick," the latter being mixed with some of the dried tankage.

The process may now be taken up in detail at one of the factories. A short line of conveyor extends from the dock onto the scow and from 10 to 13 men with forks or shovels throw the garbage into it. This conveyor empties into a cross-conveyor, running at right angles to the first, and discharging at will into either one of the two main conveyors leading into the digester house.

So far as is practicable tin cans and similar rubbish are picked off the conveyor before the garbage goes to the digesters. The solder is melted from the cans, and the tins, while hot, are placed in a form and compacted by a little trip hammer into bales weighing about 85 pounds per cubic foot. These are shipped away for melting into window weights, etc.

The scows can be moved along by means of an engine, so it is not necessary for the shovellers to carry the garbage from remote points of the scow to the short conveyor. The conveyors for green garbage are moved by an independent engine. Originally, the garbage was thrown from the scows by hand into coal buckets, which were swung around on the dock, the latch slipped and the contents dumped into a hopper so arranged that the garbage could be dumped by it into either one of the main conveyors.

The conveyors for green garbage (see Figs. 4 and 5, on the inset sheet) are continuous steel troughs, with blades, or flights, at right angles, some 2 ft. c. to c., carried forward by sprocket chains, to which the blades are attached. Over the digesters, at proper intervals, sliding doors, operated by rack and pinion, are placed in the bottom of the conveyors. Beneath each door is a funnel and a feed pipe, Fig. 8, with a swivel joint, so any one of four digesters may be fed through it.

There are 48 10-ton digesters in each digester house, placed in two pairs of rows of twelve per row. Unless crowded, not over eight tons are placed in one digester. Each digester is a vertical steel cylinder, 5½ by 14 ft., not including the dome-shaped top and conical-shaped bottom, the latter being about 2½ feet deep. The cylinders, laterally, are composed of ⅝-inch steel plates, lap-jointed, with double-riveted vertical and single-riveted horizontal joints, the rivets being ⅞-inch in diameter. The heavier tanks replaced lighter ones, composed of ½-inch plates. The dome-shaped tops of the digesters are also made of steel plates, having openings for charging the digesters. The doors or covers are of cast iron, hinged to a frame. A circular ring of lead pipe is used for a gasket between the door and frame, the door being fastened by means of swing or hinged bolts, as shown in the view, Fig. 8.

A horizontal gate valve, shown in Fig. 9, controls the discharge end of the digester.

Before a digester is charged with garbage, water is admitted to a depth of 3 or 4 feet. When charged, the charging door is locked and the garbage is cooked about eight hours, under a pressure said to range from 30 to 80 pounds, the temperature increasing as the cooking progresses. The boiler pressure is from 90 to 100 pounds.

The digesters are connected, in sets of four, with receiving tanks (see Fig. 9), also made from steel plates, each tank being 14¼ feet long, 12½ feet wide and 7 feet high and having a bottom sloping each way to the center. Here an opening is provided for discharging the cooked garbage onto cars, where it is built up by the aid of wooden racks and gunny-sacks into forms or cheeses and run beneath the presses. A telescopic pipe, adjustable to the height of the form, is used to convey the garbage from the receiving tank onto the racks. By having four digesters connected with one receiving tank the track system and the press-filling operation are simplified and it is only necessary to have one discharge opening to the outer air for each four tanks.

The racks are five feet square, made up of wood slats. The gunny-sack is turned up around the edges of the wet garbage and secured by wire pins to prevent squeezing out the garbage at the sides.

There are 16 presses (Fig. 10), eight on each side of the digester house, made by the Boomer & Boschert Press Co., of Syracuse, N. Y. They are of the four-screw, three-speed type, and are operated at a pressure of about 100 pounds per square inch on the press head, or platen. The pressing is started with the screws working at a high speed, continued at mid-speed, and finished at the slow speed. When the process is completed the cars are run to the end of the building, the tankage emptied from the racks and sacking into a flight conveyor and lifted to and dumped on the second floor. From this floor the pressed tankage is shovelled into the driers.

There are twelve driers, made by Theo. Smith, of Jersey City. The driers, shown by Fig. 11, are steel cylinders, about 5 feet in outside diameter and 14 feet long, placed horizontally and carrying a charge of two or three tons. They are jacketed with live steam under say 75 pounds pressure. A central shaft, provided with blades, is rotated to keep the tankage stirred up while drying. The dried tankage is now discharged from one end of the driers into cross-conveyors leading to the screens. An Anderson drier and mixer is used for the part of the tankage to which the "stick" is added. This product is of a higher grade than the ordinary tankage.

The tankage and screen house contains three rotary screens and ample room for storage. The tailings from the screens, after having bones picked out, are used for filling purposes.

The screened tankage is bagged and sold to manufacturers of fertilizers.

Having followed the solid portion of the garbage through the whole process of treatment the liquids may next be considered. A drainage system is provided beneath the press-room floor, which collects the water and grease from the presses. The hot water and grease go to a series of grease traps, or tanks provided with partitions extending only part way to the bottom. The grease and water separate by cooling and the grease is pumped to settling and storage tanks, to be barreled for shipment. The water is pumped to filtering tanks, where more grease is removed by skimming, and finally goes to the evaporators, of which there are three. A modified form of triple effect sugar evaporator is used, the vacuum increasing as the evaporation progresses. A vacuum pump and a centrifugal pump is placed beneath each drier, the latter serving to lift the liquid from one drier to the next. The final product, or "stick," is mixed with some of the tankage, as already described.

There remain for consideration the provisions made to prevent nuisances incidental to the concentration, handling and treatment of such immense quantities of garbage. The only thing of the kind possible while the garbage is being unloaded from the scows and conveyed into the buildings is the use of deodorants, of which a variety have been tried. A plant for producing hypochlorite of sodium from sea water by means of electrolysis, under the trade name of "electrozone," has been installed. Deodorants are not necessary during cold weather. In the summer they are sometimes applied at the city dumps, by the Street Cleaning Department, Smith's carbolic powder having been used recently for that purpose. The scows are washed down after each trip with hot water and sprinkled with chloride of lime.

The free steam and gases in the digester and press house are exhausted by an immense Sturtevant fan, some 20 feet in diameter, and 6 feet face, and passed through a large scrubber, as shown by Figs. 6 and 7 on the inset sheet. This scrubber is a recent installation, designed to prevent all cause for complaints regarding the escape from the building of offensive odors due to the open handling of green and cooked garbage. A large centrifugal pump, with a rated capacity of 3,500 gallons a minute, supplies water to the scrubber through perforated brass pipes extending across its top, as shown in Fig. 7. A series of paddle-wheels below keeps throwing the water upwards, after it has fallen, and the baffle boards do their part towards keeping the interior of the scrubber filled with sprays of water. The vapors and gases exhausted from the building are supposed to be largely condensed in traversing the length of the scrubber. Anything remaining goes up the tower at the discharge end, where further scrubbing takes place.

The gases from the digesters, driers and evaporators are passed through spiral jet condensers. There are three condensers connected with the driers, and one each with the digesters and evaporators. In the condensers the gases and a jet of cool water fall together in a closed pipe about 30 feet long, a tank at the bottom receiving the original water and condensed vapors. Uncondensed gases were formerly passed under the rear end of the boilers, but they are now discharged under water. Professor Landreth stated in his report, dated June 30, 1898, that the digesters and condensers usually work under a vacuum of about 15 inches of mercury, but that the drier condensers showed only ½-inch. He stated further:

In the condensers connected with the evaporators and with the driers, no uncondensed gas remains, at least no odor was detected and no provision is made for piping it away. The temperatures of the air, water used for cooling and final temperature (° F.) of water after condensation as I found them on the 29th inst., are as follows:

	Air.	Sea (or condensing water).	Driers.	Water in condensers on digesters.
Original	75	68	80	110
Increase	..	..	12	42

Professor Landreth called attention to the fact that the uncondensed gases passing to the chimney base had a temperature of 110° F., " while the chimney gases have a probable temperature of about 600° F.," from which he concluded that "no combustion of this gas is at all probable." This has been recognized by the company and the gases are now discharged under water, as reported above.

Twelve Coatesville boilers, of about 250 horse-power each, were provided for the original plant and five have been put in since for the Brooklyn addition. Four 150 horse-power horizontal Corliss engines furnish power to both the old and new plants, besides which there are employed for various purposes one 100 and two 50 horse-power upright engines. Two air compressors are provided for the air-lift pumps and there are three dynamos for lighting purposes. There are several pumps connected with the works, supplying water for the boilers, condensers and scrubbers and lifting the water and grease that comes from the presses. The water supply for the boilers and digesters is from two 6-inch wells, 857 and 914 feet deep, respectively, and is raised by air lifts. Salt water is used for the condensers and scrubbers, a 20-inch main leading from the pumps with branches of smaller pipe to each factory.

TONS OF GARBAGE COLLECTED IN NEW YORK CITY, 1897 TO 1899, INCLUSIVE.

			Manhattan, Bronx and Brooklyn		
Month.	Old New York.	Manhattan and Bronx		Brooklyn.	Total.
	1897.	1898.	1899.	1899.	1899.
January	10,120	9,050	9,460	7,800	17,260
February ..	8,410	8,720	6,730	8,050	14,780
March	10,660	10,640	8,400	8,500	16,940
April	11,770	10,660	8,930	8,740	17,670
May	14,490	12,200	13,500	9,100	22,600
June	16,420	12,800	14,330	9,200	23,530
July	16,630	13,110	15,570	10,230	25,800

			Manhattan, Bronx and Brooklyn		
Month.	Old New York.	Manhattan and Bronx		Brooklyn.	Total.
	1897.	1898.	1899.	1899.	1899.
August	15,550	15,750	18,300	10,940	29,240
September .	15,640	14,950	16,320	11,500	27,820
October	14,360	13,680	16,100	8,240	24,340
November ..	12,910	11,090	12,700	6,300	19,000
December ..	11,540	9,750	11,220	5,400	16,620.
Total	158,500	142,400	151,600	104,000	255,600

The new or Brooklyn plant is practically a duplicate of the old or New York plant. It is proposed to add 16 digesters to the Brooklyn plant, making 64 there (as shown on the inset sheet) and 112 in all, and giving a total daily capacity of about 1,200 tons of green garbage. With the present 96 digesters the managers of the plant state that as high as 1,500 tons have been treated in one day, by crowding, but this gives time for only partial cooking and no leeway for repairs or other emergencies.

The reduction works were visited on January 8, 1900, by a member of the editorial staff of this journal, in company with Messrs. Chas. A. Meade, Superintendent, and Macdonough Craven, Inspector of Final Disposition of the Department of Street Cleaning, and Thos. F. White, 41 Peck slip, New York, of the New York Sanitary Utilization Co. Besides these gentlemen we are indebted to the following for courtesies and information: Jas. McCartney, commissioner, and F. M. Gibson, deputy commissioner, of the Department of Street Cleaning; Chas. Edgerton, M. E., of Philadelphia, chief engineer, and W. W. Gooch, 15 Wall street, attorney for the contractors.

The amounts of garbage treated at Barren Island by months since the works were started is shown by the accompanying table.

No satisfactory figures are available for the borough of Brooklyn prior to 1899. In 1897 about 10,000 tons of garbage from the city of New York, as it then existed, were sent to sea, divided about equally between the first four months of the year. In 1898 only 35 tons of garbage from the boroughs of Manhattan and Bronx were taken to sea, and in 1899 there were 1,300 tons gotten rid of in that manner. These figures, as well as those in the table, were prepared especially for us by Mr. Meade, who states that except for the 11,335 tons sent to sea the 556,500 tons total given in the table were treated at the Barren Island reduction works. Estimating at about 160,000 tons the amount sent from Brooklyn to Barren Island during the two years 1897-98, the total amount reduced since the plant was put in operation would be 700,000 tons. The total amount collected in 1899 averaged 484 tons a day for Manhattan and the Bronx and 332 from Brooklyn, or 816 tons in all. It will be noticed that the amount collected in Manhattan and the Bronx in 1898 was 10 per cent. less than in 1897, and about 5 per cent. less in 1899 than in 1897. As the population has doubtless increased, either the garbage had more ashes and other refuse mixed with it in 1897 than since, or more of the garbage has been put in ash cans during the past two years than formerly. The report of the Street Cleaning Department for 1898 attributed the diminution in garbage for that year to mixing it with ashes.

Exhibit B.

The Thackeray Incinerating and Fertilizing Company.

PROSPECTUS OF THE COMPANY.

Effectual Sanitary Garbage Disposal.

Health and the Problem of its Preservation.

One of the first and highest considerations to every citizen is the one of health, as it is the first and highest duty of public servants to contribute by every means within their knowledge to its

Preservation and Betterment.

In every city (and especially in the densely populated neighborhoods) the daily production of waste kitchen refuse is enormous. The problem of how best and the most certainly to escape the baneful effects on health which garbage exhalations diffuse throughout a community has during many years been one of the most difficult and trying questions with which Municipal Health Boards have been called upon to deal.

The Barbarisms of the Past.

Most observant persons are to some extent familiar with the advances made in sanitary science over the last two decades, and the earnestness with which sanitarians have given themselves to the task of discovering remedies for evils, which have been permitted to continue with slight improvement, partially owing to the timidity of public officials in appropriating from the public revenues, and partially because of the skepticism toward new inventions, in the face of repeated failures and disappointments.

Progress Has Really Been Made.

Gradually cities of the better class whose citizens were enterprising revolted against the primitive and preposterous methods of dumping rotting refuse and garbage in the outlying precincts—burying the night-soil, and thus polluting stream and land on the false supposition that they were harmless, when it is now known that even so seemingly small a matter as neglect to boil dish-clouts is provocative of disease, and methods came into use promising immunity from the worst evils which grew up under the older system.

The Commercial Aspect of the Case.

Very early in the history of garbage disposal the discovery was made that a commercial use could be made of certain of the constituents of garbage. These methods have come to be known as reduction or utilization systems, and the facts concerning them, briefly summed up, are that they have in most cases proven to be such a serious threat to the public health that the courts are repeatedly being appealed to, looking to their abatement, and in most cases with the result that they have been enjoined. This naturally gave rise to a renewed activity on the side of inventors to devise some plan fulfilling the sanitary requirements of the case, and to accomplish it at a cost within the means of the people.

Fire had long been rightly considered the most effectual agency to accomplish these highly desirable ends; but the great trouble was, fuel was costly, and every attempt to minimize in this particular was followed by a corresponding loss of sanitary efficiency.

The Inauguration and General Adoption of Cremation.

It has remained for Mr. Charles Thackeray, an English Technical Engineer of distinction, to achieve in the interest of cremation what none of his predecessors in this field of scientific inquiry have had the ability to accomplish.

He recognized that success depended upon producing a furnace supplying the highest and broadest demands of scientific sanitation, which would accomplish the result at the lowest conceivable cost, and combining scientific principles in such a way that it would consummately burn or incinerate mixed refuse, garbage, night-soil, street sweepings and ashes, wholly without the aid of fuel, thus reducing the cost of treatment to the sum necessary for labor and maintenance.

The Thackeray furnace effects sanitary ends, in conformity with scientific sanitary principles, and it is the purpose of the owners of the device to introduce it throughout the country on the highest possible sanitary plane only, and no man will seek to contend that a delivery of mixed wastes is not the proper way to make a sanitary start, if sanitary issues are indeed those which are desired.

We must all admit that dry litter and refuse accumulations have to be disposed of in some way. It costs something to collect, haul and dump them. It is the simplest possible municipal arrangement to combine ashes and dry refuse with garbage collection, thus assuring that the putrefactive processes will be retarded, that the baneful and offensive odors from the garbage cart will be neutralized, and the spilling of swill into the streets prevented. This plan, we are confident, will recommend itself to every thoughtful sanitary official at once.

Without exception, every other type of furnace or crematory burns fuel, and to those who have studied the question the fact is known that the chief consideration with the inventors of them all has been to minimize the cost attendant upon its consumption. But the fact is, excepting the Thackeray Incinerator, every form of crematory in use to-day is handicapped by the expense of burning fuel, and it is a circumstance which places other cremators out of the race in the matter of economic destruction.

Important Facts Concerning the Thackeray Incinerator.

The Thackeray Incinerating and Fertilizing Company, a corporation with a capital stock of $1,000,000, owns the United States patents covering the Thackeray Incinerator, now in use in Montreal, Canada, San Francisco, California, and plants are in course of construction in several other cities.

The Thackeray Incinerator burns garbage, refuse and night-soil, either mixed or unmixed with ashes and street sweepings, without the aid of fuel. The refuse is its own fuel. The cost of operating is therefore limited to the cost of labor and maintenance.

There is no other expense, as the plant is fire-proof and insurance is not required. The cost of repairs at Montreal, where the capacity is 150 tons per twenty-four hours, has been very small during the five years it has been in operation, the average sum expended there for repairs not exceeding $200 per annum, and while the incinerator at Montreal has proved efficient and satisfactory during five years of continuous service, yet we emphasize the fact that it was built previous to the present perfection of the invention and the securing of letters patent in the United States. Therefore, it is to the Thackeray Incinerator at San Francisco that we confidently refer as the greatest sanitary and economic destructor of city refuse in the world. In the eighteen months' run at San Francisco, where the capacity is about 700 tons per twenty-four hours, and the largest incinerating plant in the world, no repairs have been required. The cost for lights at these two plants is merely nominal, and the cost for maintenance, therefore, is the cost of labor only.

The report of the official test at Montreal, which is hereto annexed, shows the average cost for six days' run at fifteen and three-fourths cents per ton, but it is not claimed that the garbage and refuse is burned at that rate at Montreal during the whole year, the percentage of ash in the winter increasing the cost of burning. The plant is under municipal control, and, as a rule, the best economical results are not obtained under public ownership. At San Francisco the average monthly cost of burning is between ten and twelve cents per ton.

Aside from the very low cost at which refuse can be disposed of by the Thackeray Incinerator, the most gratifying proposition connected with its operation is the sanitary method of its disposition. That San Francisco has at last solved the problem of the sanitary disposition of its refuse is evident from the annexed letter of the president of the Sanitary Reduction Works of San Francisco, the company holding the contract in that city for the incineration of its garbage and refuse, to the president of this company, and from the official resolution passed by the California State Board of Health at its regular monthly meeting at the State capitol on the 15th day of January, 1898, which is also annexed, and from the communication of the board of supervisors of San Francisco, addressed to the president of the local company under date of January 17, 1898.

The letter of Hon. L. R. Ellert, the president of the San Francisco corporation, to the president of this company is replete with interest. The details given by him of the operation of the Thackeray Incinerator, both at Montreal and San Francisco, do away with the necessity of describing the incinerator here in detail. Mr. Ellert was elected to the board of supervisors in 1889, and was re-elected in 1891. During his second term he was made chairman of the finance committee of this city. In 1893 he was elected Mayor of San Francisco, and during his term of office he gave particular attention to the sanitary condition of the city. He became president of the Sanitary Reduction Works upon its incorporation in 1896.

The California State Board of Health consists of six distinguished physicians appointed by the Governor of the State, who serve without salary. No greater indorsement of a quasi public enterprise affecting the health interests of a city could be had than the deliberate result of the careful investigation (officially expressed) of the Board of Health of the State of California. The board of supervisors of San Francisco consists of twelve members, each representing one of the twelve wards into which the city is districted, but each being elected to office by a plurality of the total votes cast thoughout the whole city. Together they represent every shade of public opinion.

Has San Francisco solved the problem of a sanitary disposition of its wastes?

Letter from president of this company to President Ellert of the Sanitary Reduction Works of San Francisco:

San Francisco, Cal., *May* 15, 1899.

Hon. L. R. Ellert, *President Sanitary Reduction Works, San Francisco, Cal.*

Dear Sir—This company has been lately formed for the purpose of introducing the Thackeray incinerator and fertilizing system, for the destruction of garbage, ashes and refuse matter into the various cities of the United States. As San Francisco is the first city in the United States, and the first city on this continent, outside of Montreal, Canada, to adopt this process, I would esteem it a favor if you would write me a plain statement of the experience of your company with the Thackeray Incinerator. The points that I particularly would like to have covered are the cost per ton for incineration and as to whether or not the process is a sanitary one.

Your obedient servant,

R. BRENT MITCHELL,

President Thackeray Incinerating and Fertilizing Company.

The answer.

San Francisco, Cal., *May* 20, 1899.

R. Brent Mitchell, Esq., *President of the Thackeray Incinerating and Fertilizing Company, S. F., Cal.:*

Dear Sir.—In reply to your favor of the 15th inst., asking me for details of the operation of the incinerator now in use by the Sanitary Reduction Works of San Francisco, of which company I am president, and particularly in reference to cost and sanitary features, I take pleasure in submitting the following, which goes beyond the scope of your enquiry, for I have taken the liberty of prefacing the information you desire by a short history of the contract and reasons which induced the company to select the particular process finally adopted by it.

On February 17, 1896, the city of San Francisco awarded F. E. Sharon, and his assigns, an exclusive contract to reduce or cremate for the term of fifty years, all garbage and refuse matter, including ashes, and to charge the householders and producers at the rate of twenty cents per cubic yard upon delivery at the works, the city to receive two per cent. of the gross proceeds for the first fifteen years, and five per cent. of the gross proceeds for the remaining thirty-five years. In San Francisco, unlike the system used in most of the other cities in the United States, the garbage and ashes are mixed together, and the city does not bear any portion of the cost of removal, the cost being borne by the householders and producers. The refuse is removed by scavengers, who charge the producers a small monthly rate, and, until work began under this contract, the garbage and ashes had always been dumped on vacant lots in the city limits, designated by the Superintendent of Streets. This created a continuous nuisance, and proved a constant source of complaint and annoyance, and was at all times an active factor in the death rate. Upon the execution of the Sharon contract, the matter was litigated by opposing interests, and the result of the litigation was that the courts held the contract to be within the police and health powers of the Board of Supervisors, and in all respects valid and binding, and that under its terms all the garbage, ashes and refuse matter of the city, other than street sweepings and night-soil, must be delivered to the grantee, or his assigns, for reduction or incineration, as should finally be determined upon, at their works, to be constructed by him or them within two years after the date of the contract. Our sewerage system disposes of all the night-soil, and the street sweepings are covered by another contract. Thereupon the sanitary reduction works of

San Francisco was incorporated under the laws of California, to which corporation Sharon, with the approval of the proper authorities, assigned his contract, and I was sent east in the interests of the company to examine into the various processes used by the different cities throughout the United States for the disposition of their refuse, and to recommend some particular system to the Company that might be suitable. We were determined to have nothing but the best. Our first intention was to put up reduction works. I found that the principal reduction plants were located at Philadelphia and St. Louis. The former city had adopted the Arnold process, subsequently put in use for New York at Barren Island; and the latter city the Merz process. In Philadelphia the city is divided into five districts, the garbage of three districts being disposed of by reduction, and of the two remaining districts by the Smith-Siemans crematory. Upon an inspection of the reduction works at Philadelphia, I found the reduction process could not be used in San Francisco, because the ashes and garbage are mixed, unless a system of screening was resorted to, which was impracticable; and so the idea of recommending to the Company the construction of a reduction plant was abandoned. At any rate, the expense of reduction was too great a cost, exceeding at both Philadelphia and St. Louis, at a minimum, $1.80 per ton, and the returns problematical. I had not the returns of the Barren Island plant before me, but that plant handles pure garbage only unmixed with house refuse and I can safely say that the reduction of garbage is not a commercial proposition unless the supply of clean garbage would insure the large investment required. The Merz Reduction Works at Milwaukee, Wisconsin, were abandoned and an experimental plant at Chicago proved a failure. The works erected to reduce by the Simonin process at New Orleans, Cincinnati and Paterson, New Jersey, were failures. In addition to this, every reduction process leaves a residuum, which, if it is intended to dispose of the garbage in a sanitary manner, must itself be disposed of by cremation. Again, reduction only disposes of clean garbage—fats and vegetable matter—and as our contract required a final disposition of all the refuse of the city other than night-soil and street sweepings, we would have been forced to incineration of the major portion of the refuse to be handled under the contract, even if we had adopted a reduction system for the clean garbage.

I then turned my attention to the process of incineration, and found a number of crematories in use in different places in the United States, notably the Dixon at Atlanta, Georgia, the Rider at Alleghany, Pennsylvania, the Smith-Siemans in the two districts of Philadelphia, the Brownlee at San Antonio, Texas, and the McKay at Yonkers, New York. The largest one of these cremators is in Philadelphia, where there are two plants, each with a capacity of 100 tons per twenty-four hours.

It is unnecessary to enter into a detailed account of the workings of the incinerators above mentioned, or of a number of others, including the Engel, the Burns, and the Anderson. Every one of the cremators in use in the United States requires the use of coal, wood or gas to burn the garbage, some of them requiring the use of both coal and wood, and even if a furnace of these American types could have been erected with a capacity sufficient to burn the output of the city of San Francisco, which I do not believe could be done, the cost of fuel here would have rendered their systems impracticable, under the conditions of our contract. Upon a further examination into the operations of these different systems, even at the low prices at which wood, coal and gas could be purchased in the country east of the Mississippi River, I came to the conclusion that none of them could cremate the refuse under sixty to seventy-five cents per ton as a minimum rate, and most of them were going much higher. I find that my conclusion in this regard has been since borne out by the exhaustive report of Joseph B. Taylor, late inspector of offensive trades in Brooklyn, New York, to Wm. W. Locke, late Sanitary Engineer of Brooklyn, New York, and annexed to the report made by the Bureau of Sanitary Engineering to the Hon. Z. Taylor Emery, M. D., late Commissioner of Health for Brooklyn, reprinted, with additions, from Brooklyn Health Department Report for 1896. In that very conservative statement of the workings of the different reduction and incinerating plants throughout the United States, at page 118, Mr. Taylor uses the following language: "As between incineration and reduction for the sanitary disposition of refuse, it must be conceded that incineration is by far the better. Incineration can be made inoffensive, reduction cannot always. Incineration has not always been free from objections, partly due to inherent defects of the type of furnace, and partly due to the disinclination to use the requisite amount of fuel to destroy thoroughly all noxious fumes. On the other hand, fuel is money, and the element of cost is introduced as a governing factor. Incineration can be counted on to cost from seventy-five cents to $1 per ton for garbage destroyed, while reduction plants are now running which are receiving garbage for much less, apparently leaving a good margin to spend for sanitary appliances, to overcome their short-comings. Notwithstanding the lower prices asked by some reduction concerns, I do not believe it has yet been demonstrated that these establishments can operate at a profit at these figures. Expensive machinery and apparatus are required in all reduction works, and the material handled is exceedingly destructive to these, requiring frequent renewal and repairs, which admit of calculation only after the establishment has been in operation two or three years. Further, there is a tendency for garbage to become poorer in grease as the country becomes older, although this may not be noticeable for some years to come."

I do not know of any reduction plant anywhere that is charging the municipality less than seventy-five cents per ton. Certainly there is no method in existence where garbage can be reduced at that figure. If there is any contract in force anywhere, under which the contractor accepts garbage for reduction at a figure less than $1.50 per ton, he begins his enterprise with a net loss of at least seventy-five cents per ton, and must look to the sale of his bye-products for recoupment. In this statement I am again borne out by Mr. Taylor, who, in his same report, at page 76, after giving a very interesting and detailed account of the various reduction systems now in operation, says: "I am of the opinion that it costs from $1.50 to $2.50 per ton to treat garbage by reduction, depending upon the system used."

My attention was then directed to the Thackeray Incinerator, at Montreal, Canada, and I visited the plant there and watched its operation closely for several days. This plant was the only one of its kind in operation on this continent, and at once recommended itself very strongly to me, because it burned garbage, ashes, street sweepings and refuse matter all mixed together, without fuel. To see garbage and refuse, in the dead of winter (for my visit to Montreal was in the winter season), delivered at these works, frozen to a solid mass, accompanied with icicles and blocks of snow, dumped from the wagons and finding its way into the furnaces within a few hours after its arrival at the works, and there burnt clean, without the use of any fuel whatever, other than the garbage and refuse itself, which included ashes, was a revelation to me.

After a careful examination into its practical workings, I came to the conclusion that the Montreal process was exactly what was wanted in San Francisco, and I therefore recommended the Thackeray Incinerator to the Company. The Company acted upon my recommendation, and Mr. Thackeray, the inventor, an English engineer of high standing, was brought to San Francisco to make the necessary plans and to supervise the construction of the works. The Company purchased a block of ground in the southern portion of the city at a reasonable figure. The building of the works was commenced in the Spring of 1897, and completed and the works turned over to the Company in September of that year. The buildings consist of two incinerating houses, with the chimney between. They form together three sides of a square, 265 feet long by ninety-five feet wide, and two stories in height. There are sixteen large cells in each incinerating house, making thirty-two cells in all, with a grate area of ninety-six square feet each, making a total of 3,702 square feet of grates. Each cell has a capacity of twenty tons per twenty-four hours. The cells are the largest in the world, the nearest approach to them in size being those of the destructors used in England, the largest of which have twenty-five square feet of grate area. There are four crematory furnaces designed for the cremation of smoke, with a capacity, however, of fifteen tons, and which can be used to meet any extraordinary delivery of refuse. The chimney is 265 feet high, with a concrete foundation fifty feet square by three feet thick. From the top of the concrete to the ground line it is solid brick work forty-seven feet square, and steps back to thirty-two feet are twelve feet high. The trunk is thirty feet square by forty feet high with walls eight feet thick from the top of the trunk to the top of the house. The walls are built circular 210 feet high, which makes it 265 feet from the base. The flue is lined with fire brick fifty feet high and topped with a cast iron cap of special design. This is the largest and tallest chimney ever built to dispose of garbage and refuse in the world. All the buildings are built with solid brick walls, with galvanized iron roofs and cast iron furnaces, grate bars and hoppers. They are very substantial buildings. The workmanship has been executed in a first-class manner and the whole works are thoroughly fire-proof, doing away with the necessity of insurance. The incline roadways, platforms, office and buildings cover an area of 400 feet by 200 feet. The entire premises are surrounded by a high, grooved board fence, with an entrance and exit for the carts. At the entrance is a one-story brick office, where the cash is collected as the carts are admitted. The carts drive up inclined roadways to the top of the building and there dump their contents into chutes leading direct to the hoppers, through which the garbage and refuse is fed into the furnaces.

Upon the construction of the works a test was inaugurated and continued for some three weeks. In the making of this test there was an average consumption of about 350 tons of garbage per day of twenty-four hours. The test was in every way satisfactory, the garbage burning clean, and its residuum, consisting of clinker and ash, being entirely free from deleterious substances. The following is an analysis of the ash and clinker made during the test run:

	Clinkers.	Ashes.
Unconsumed Carbonaceous Matter	1.82%	6.74%
Silicon Dioxide	51.91%	45.54%
Iron Sulphide	2.73%	0.75%
Copper Sulphide	0.86%	trace
Lead Sulphide	0.48%	trace
Phosphorice Acid	0.81%	2.52%
Aluminum Oxide	14.30%	12.71%
Iron Oxide	1.00%	1.92%
Calcium Oxide	15.45%	19.59%
Magnesium Oxide	1.89%	1.26%
Pottasium Oxide	0.82%	1.46%
Sodium Oxide	1.73%	0.83%
Sulphur Trioxide	1.64%	4.10%
Carbon Dioxide	3.94%	2.34%
Loss and Undetermined	0.62%	0.24%
Total	100.00%	100.00%

There was an utter absence of gases, fumes, odors or noxious vapors in and around the works. This test was carried out under the supervision of the Mayor and Board of Supervisors, and the Board of Health. The percentage of ash, as I had anticipated, was not as large as in Montreal, but would of course increase during the winter months. A large amount of fruit, which is very plentiful here, found its way among the garbage, thus increasing the percentage of water, but it occasioned no difficulty whatever, the furnaces burning everything that came to it to a clean ash and a thoroughly metallic clinker. Upon the completion of the test, the city authorities were notified that the Company was ready to handle the garbage of the city, and on the 4th of November, 1897, the Board of Supervisors, by unanimous vote, passed an ordinance directing the closing of the city dumps from and after the 8th of November, and requiring all the house refuse, butchers' offall, garbage, refuse, dirt, ashes, cinders, sludge, broken glass, crockery, tins, bones, rubbish, or other like matter, dead animals (not otherwise provided for by contract theretofore granted by the city and county), all putrid animal and vegetable matter and fish, flesh and food condemned by the Board of Health as unfit for human food, to be delivered to the incinerator of the Sanitary Reduction Works at the expense of the person, company or corporation so conveying the same, to be there cremated and destroyed, or subjected to such disposition and treatment as would secure and effect a complete combustion of all gases and odors arising therefrom. This ordinance was at once approved by the Mayor, and on the 8th of November the Company began burning the refuse of the city under its contract.

This plant has now been running for eighteen months. The fires kindled on the 8th of November, 1897, have never gone out. The furnaces show no sign of deterioration whatever. The only repairs in connection with the furnaces were the replacing of some bricks carelessly knocked out of position by the stokers. During the period of the running, we have reduced the pay-roll of the incinerating department from month to month. In the month of November, 1897, we employed fifty-seven men—we now do the work with twenty-five. We have sunk an artesian well which furnishes 16,000 gallons a day. The residuum, consisting of ashes and clinker, we have so far used in filling up the adjacent blocks which were below grade. As soon as these grading contracts are completed we will convert the clinkers into concrete slabs for sidewalks, paving and building bricks. The ash we will mix with animal blood and phosphates and turn into a fertilizer. In the pickings department we have erected and have in successful operation a tin baling works, which removes the solder from the tin cans. The cans are turned into sash weights for windows. We have also erected and have in operation a bottle cleaning works and a rag cleaning establishment. A blacksmith shop is also in operation on the premises.

Trusting that the information I have been able to give you may be of some service in inducing other cities to adopt a sanitary process of these wastes, I remain,

Very truly yours,

L. R. ELLERT,

President Sanitary Reduction Works of San Francisco.

Copy of a resolution passed by the California State Board of Health on January 15th, 1898.

OFFICE OF CALIFORNIA STATE BOARD OF HEALTH.

MEMBERS OF THE BOARD.

J. F. Morse, San Francisco.	D. D. Crowley, Oakland.
R. W. Hill, San Pedro.	C. A. Ruggles, Stockton, *Pres't.*
C. W. Nutting, Etna Mills.	A. M. Henderson, Sacramento.

W. P. Matthews, Sacramento, *Sec'y.*

WHEREAS, a careful and exhaustive investigation into the mode of operating the incinerator lately constructed by the Sanitary Reduction Works Company, at the intersection of Rhode Island and Alameda streets, in the city and county of San Francisco, having convinced us that the refuse heretofore deposited at designated places in said city and county to the great detriment of the public health and in defiance of all the principals of sanitation is now being disposed of in a clean and healthful manner and without perceptible odor; and

WHEREAS, knowing that reduction by fire, the method employed by the Sanitary Reduction Works, is the only thoroughly scientific way of disposing of the refuse and garbage of a city, and it having been demonstrated to us that the incinerator constructed by the said company, at the intersection of Rhode Island and Alameda streets, in the city and county of San Francisco, is the most effective device yet invented for the reduction of refuse and garbage by fire, and that the said incinerator is capable of burning all the refuse and garbage which will be produced in the said city and county for some years to come, it is

Resolved, by the State Board of Health, that the incinerator constructed by the Sanitary Reduction Works as aforesaid, be, and is hereby approved and indorsed as of the greatest sanitary importance to the city and county of San Francisco, and its population.

Resolved, that in our opinion the incinerator aforesaid disposes of refuse and garbage in a thoroughly scientific manner and so as to create no odor, or so as not to be in any way detrimental to the public health.

Resolved, that we commend the example set by the board of supervisors of the city and county of San Francisco in awarding a franchise for the destruction of refuse and garbage in this manner to the favorable consideration of the authorities in other cities of this state where the material, when left to decay upon the surface of the ground, is calculated to breed disease and menace the health of their inhabitants.

I hereby certify that the above resolution was adopted by the State Board of Health at its session in Sacramento, January 15, 1898.

W. P. MATTHEWS,
Secretary.

Letter from the Board of Supervisors of the City and County of San Francisco to the President of the Sanitary Reduction Works of San Francisco.

San Francisco, Cal., *January* 17, 1898.

Hon. L. R. Ellert, *President of the Sanitary Reduction Works of San Francisco:*

Dear Sir.—We, the members of the Board of Supervisors of the city and county of San Francisco, state of California, desire to say to you that we have visited the plant and premises of the Sanitary Reduction Works of San Francisco and inspected the system now in operation there, known as the Thackeray Incinerator, for the incineration of the garbage and refuse of this city, and are much pleased at the manner in which the company is carrying out its contract. In the letting of this contract no conditions were imposed touching the system to be selected by the company other than that the garbage and refuse should be reduced or cremated in a sanitary manner. In selecting a process of incineration in preference to a process of reduction, we believe, from a sanitary point of view, your company acted wisely. We find, upon a close inspection, covering the period of your trial test extending over three weeks in September, and the running of the works under the contract since October 8, 1897, that the garbage burns clean, and that no odor, noxious fumes or gasses can be detected. The burning of this garbage without the use of fuel of any kind other than the garbage itself, is a revelation of scientific skill. We understand that your plant is the largest in the world; that it is the only one in the United States burning garbage and refuse without some kind of fuel, and we feel that its success has placed San Francisco in the lead in the matter of a sanitary disposition of its wastes, and we congratulate you as the executive officer of the company upon the part you have taken in reaching this desirable result.

LAWRENCE DEVANY, First Ward.
T. H. HASKINS, Second Ward.
P. M. DELANY, Third Ward.
JOHN H. SHEEHAN, Fourth Ward.
WASHINGTON DODGE, Fifth Ward.
JOHN LACKMANN, Sixth Ward.
T. A. ROTTANZI, Seventh Ward.
THOMAS MORTON, Eighth Ward.
J. E. BRITT, Ninth Ward.
EDWARD J. SMITH, Tenth Ward.
C. A. CLINTON, Eleventh Ward.
T. W. RIVERS, Twelfth Ward.

Official Test of the Thackeray Incinerator at Montreal.

Concerning the efficacy and economy of the Thackeray device, perhaps no more convincing proof can be laid before the reader, than the official report made on November 19, 1894, to the Health Board of the city of Montreal, Canada, where a plant having a capacity of 150 tons a day had but just been installed, and which had been built, paid for, and the proof of its efficiency established, before being turned over to the city authorities. The following is what the Montreal engineers and inspectors had to say on the subject:

MONTREAL, *November* 19, 1894.

To the Chairman and Members of the Health Committee:

Gentlemen.—The undersigned were appointed by the council as experts to report and make a test upon the Charles Thackeray Incinerator, built on Gregory farm by order of the council for the city of Montreal.

The contract calls upon the contractor to build an incinerator of twelve cells, which will consume 150 tons of refuse in twenty-four hours at a cost of ninety cents per hour. (14.4 cents per ton—Ed.)

We beg to inform you that from Monday, November 5th, up to Sunday, November 11th, the amount of refuse consumed was 811½ tons. The contract called for 700 tons in that time, according to the number of cells that were used, namely: Two days, eight cells, and four days, ten cells, making 111½ tons in excess of what the contract calls for. We could not have all the loads weighed on account of not having the scales supplied us on the ground, which we had asked the Health Committee to give us, and consequently we had to have about fifty loads weighed on the public scales as a guide.

We would draw your attention to the following items: On November 5th, ten cells were in use, and the amount burned was 175.63 tons; the contract called for 125 tons. If there had been enough material to be burned by the whole twelve cells, there would have been burned in the same ratio 215.78 tons, when the contract calls for 150 tons, making an excess of 65.78 tons in twenty-four hours.

Taking the average of the six days and the amount of refuse consumed, which was 811.5 tons, in the same ratio with all the twelve cells in use and sufficient material to burn, the consumption would be 1,043.36 tons, or 143.36 tons in excess of the contract requirement for the six days.

The cost of burning this material was as follows, viz: Engineer in charge at fifteen cents per hour, and six stokers and two dump men at a total cost of $27.60 per day burning in one day 175.635 tons in ten cells, which would be 215.78 tons in twelve cells, at a cost of $27.60. The contract calls for 150 tons at $21.60

per day, and it actually cost to burn 150 tons, $19.18. The contract requires 150 tons per day, to cost ninety cents per hour or 14.4 cents per ton.

The average cost for the six days' test was 173.9 tons per day, at $27.60 or fifteen and three-quarter cents per ton. But it was proved that the plant can burn the material for twelve and three-quarter cents per ton, which it did on Monday, November 5th.

The grate area is six by twelve feet, or seventy-two square feet, the cells each burn fourteen and one-half tons per day or 29,000 pounds, equal to 40.27 pounds per square foot per hour. The Livet generator equals thirty-three pounds, and at Oldham twenty-five pounds and at Glasgow twenty-one pounds are burned.

This incinerator in the six days has consumed at the rate of 40.27 pounds per square foot per hour.

You will note that no fuel has been used on the works, coal or wood, and we have much pleasure in placing these figures before the committee, which we think are most satisfactory in every respect.

We also find that the ashes and clinkers are non-odorous and will be very suitable for roadways or other uses that the council may see fit.

The steam that can be generated from the garbage can be utilized as power for electric light or any other motive power, and is well worthy of consideration.

The workmanship of the construction is first-class in all respects. We would suggest that an extension be built in the delivery platform to facilitate carting.

(Signed)
PERCIVAL W. ST. GEORGE (C. E.), *City Engineer.*
J. G. DORE, (C. E.), *City Sanitary Engineer.*
G. O. CHAMPAGNE (S. E.), *City Boiler Inspector.*

We are firmly of the conviction (allowing for all the excellencies which other cremators claim for themselves) that cities and towns now in search of a consummately sanitary device to destroy refuse of every description, can make no mistake in fixing upon the Thackeray, for unquestionably it is the one to have solved the problem of how to achieve the maximum of work, at the minimum of outlay to tax-payers.

The company issuing this pamphlet are the owners of the Thackeray patents in the United States, and it * * extends invitations to interested parties who may be desirous of supplementing the information here given, to visit the office of the company, where a ready means will be supplied of witnessing the practical operations of the Thackeray Incinerator, provided other means fail to impress them that it is the best incinerator ever invented.

The Thackeray Incinerating and Fertilizing Company will either construct its plants under a contract directly with the municipality, the municipality to own the plant when completed, or, it will form local companies in the various cities, and, through the agency of such local companies, take the contract for the incineration of the garbage and refuse. It will also dispose of territorial rights to parties having *bona fide* contracts. All communications may be addressed to the Thackeray Incinerating and Fertilizing Company at its main office, 401 California street, San Francisco, California, to its subsidiary companies, see page 6, or to its general eastern office, rooms 411-412-413 Singer Building, Broadway and Liberty street, New York.

HOW SAN FRANCISCO DISPOSES OF ITS GARBAGE.

[Scientific American, October 22, 1898.]

The contrast between the methods by which New York and San Francisco, divided by 3,000 miles and situated, the one on the western shores of the Atlantic, the other on the eastern shores of the Pacific, dispose of their unsanitary waste is marked. In New York the garbage and house refuse are kept in separate vessels; in San Francisco they are mixed together. In the former city the odors arising from pure garbage, kept for several days in warm weather in the basements or back yards of the householders, are apparent at a considerable distance; while in the latter city the garbage, mixed in the same vessel with the ashes from the kitchen and the other house refuse, practically has no odor. In New York the pure garbage is collected and loaded upon scows at the city's expense and delivered to the New York Sanitary Utilization Company, where it undergoes a reduction process at the company's works on Barren Island, and come out into a residuum consisting of tankage and grease. In addition to the cost of collecting and hauling this garbage, the city pays $89,900 per annum to the reduction company. The refuse is carried out to sea by barges towed by tugs and there thrown overboard into the sea. The larger portion of this refuse finds its way to the beaches, and renders the Jersey shore anything but a pleasant abiding place.

In San Francisco it had been the custom from time immemorial to dump the garbage and refuse on vacant lots. Some ten years ago this system was changed, and the municipal authorities designated a dumping ground consisting of low and submerged lands in the southern district of the city, but, as that portion of the city grew up, the complaints against this disposition of unsanitary substances became numerous, and the municipal authorities finally decided to sell to the highest bidder a franchise for the term of 50 years for the sanitary destruction of this material. On February 17, 1896, the privilege of disposing of the garbage and refuse of the city in a manner satisfactory to the health authorities was sold to the highest bidder for the term of 50 years, in consideration of the payment to the city of $2,510 in cash and two per cent. of the gross receipts for the first 15 years and five per cent. of the gross receipts for the remaining 35 years. This contract required the householders to have all their garbage and house refuse, the latter consisting of dirt, ashes, sludge, broken crockery, tins, cinders, bones, and other like material, also all putrid vegetable matter and condemned fish, flesh and food, carried to the works to be erected by the contractor or his assigns, and to pay to such contractor twenty cents a cubic yard for such destruction, payable upon delivery. Here again the system differs from that in New York and the other eastern cities, those cities collecting and disposing of their wastes at the city's expense, while in San Francisco the householders bear the entire burden. This system, however, is not altogether equitable, and a strong movement is now on foot to change it and to have the entire expense borne by the municipality. The garbage and refuse of San Francisco varies from two to three cubic yards per ton, a fair estimate would probably be two and a half cubic yards a ton, making the price paid by the householders to the contractor for destruction about 50 cents a ton, which is less than it costs the city of New York for reducing its pure garbage alone. This contract was assigned by the successful bidder to the Sanitary Reduction Works, of San Francisco, which company selected the Thackeray process of incineration, then and now in use on a small scale in one of the three sanitary districts into which the city of Montreal is divided; bought a block of ground in the southern portion of the city, and erected thereon what is now the largest garbage incinerator in the world. The test run was made for 30 days during September and October, 1897, and on the 8th day of November last, San Francisco entered upon its new era of the sanitary disposition of its poisonous wastes.

The main buildings consist of two incinerating houses, with the chimney between. They form together three sides of a square, 265 feet long, by 95 feet wide, and two stories in height. There are 16 large cells in each incinerating house, making 32 cells in all, with a grate area of 96 square feet each, aggregating 3,072 square feet of grates. Each cell has a maximum capacity of about 20 tons per 24 hours. These cells are the largest in use, the nearest approach to them in size being those of the destructors used in England, the largest one of which has 25 square feet of grate area. There are four crematory furnaces for the cremation of smoke and gases; these can also be used to meet any extraordinary delivery of refuse. The chimney is 265 feet high, with a concrete foundation 50 feet square by three feet thick. From the top of the concrete to the ground line it is solid brick 47 feet square, and steps back to 32 feet, are 12 feet high. The trunk is 30 feet square by 40 feet high, with walls eight feet thick from the top of the trunk to the top of the house. The walls are built circular, 210 feet high, making the chimney 265 feet from its base. The flue is lined with fire brick 50 feet high and topped with a cast-iron cap of special design.

This is the largest and tallest chimney ever built to dispose of garbage and refuse. All the buildings are built in a substantial manner with solid brick walls, galvanized iron roofs, cast-iron furnaces, grate bars and hoppers. The works are fireproof. A well has been sunk upon the premises furnishing pure water, and with a capacity of 10,000 gallons per day. A rag cleaning and bottle cleaning plant has also been erected, the former capable of cleaning 300 pounds of rags an hour and the latter can wash several thousand bottles per day. A furnace has been erected for the melting of solder from the tin cans and is now in operation. Tin baling works are also in operation, where the tin is baled and shipped to foundries and made into window weights. The inclined roadways, platforms, offices, and buildings cover an area of 400 by 200 feet. The total investment of the company has been about $150,000. The maximum capacity of the furnaces and auxiliaries is 700 tons per day, but the entire output of the garbage and refuse of San Francisco has not yet reached that figure. The scavenger wagons commence arriving at daylight and the deliveries are practically over by four o'clock in the afternoon. The works are surrounded by a high board fence. At the entrance is the office of the company, and through this entrance the wagons drive up inclined roadways to the top of the two incinerating houses, where the contents of the wagons are dumped down inclined chutes. On either side of these chutes the pickers take their places and pick out everything of commercial value, such as tin cans, bottles, rags, bones, and even old bread, which is sold to the Chinese chicken gardens. At the foot of these chutes are the mouths of the hoppers where the garbage and refuse enter. The cells themselves are plain rectangular furnaces with arched crowns set at an angle; the hoppers slope upward at the rear of the grates at an angle of about 45 degrees, terminating in their upper ends in a charging door. On each side of these hoppers are flues opening into a main flue. The products of combustion from the cells pass by means of the main flue to the crematory furnaces and thence to the chimney. After one charge of the garbage and refuse is burned in a cell, enough of it is left in the shape of embers and live coals to ignite the next charge coming down. In this way the fires never go out and the embers from one cell can always be utilized to assist the burning in another cell. A charge consists of about three tons, and can be thoroughly incinerated, according to the character of the material in from 2½ to 4 hours. The residuum from this burning consists of ash and clinker, both of commercial value, the former proving an excellent base for a fertilizer, while the latter, ground up and mixed with ten per cent of lime, makes a very excellent mortar; or, mixed with concrete and clay in proper proportions, can be made into an ornamental brick of any color desired. The following is an analysis of the ash and clinker made during the test run:

	Clinkers. Per cent.	Ashes. Per cent.
Unconsumed carbonaceous matter	1.82	6.74
Silicon dioxide	51.91	45.54
Iron sulphide	2.73	0.75
Copper sulphide	0.86	trace
Lead sulphide	0.48	trace
Phosphoric acid	0.81	2.52
Aluminum oxide	14.30	12.71
Iron oxide	1.00	1.92
Calcium oxide	15.45	19.59
Magnesium oxide	1.89	1.26
Potassium oxide	0.82	1.46
Sodium oxide	1.73	0.83
Sulphur trioxide	1.64	4.10
Carbon dioxide	3.94	2.34
Loss and undetermined	0.62	0.24
Total	100.00	100.00

The furnaces are so simple and have been built in such a substantial manner that they will last for a long time. When repairs are necessary, one cell can be closed down without interfering with the burning of any of the other cells. The cost of burning is limited to the cost of labor. There are 23 men now employed at San Francisco in the incinerating department. This is outside of the number of men employed in the picking department, which more than pays for itself.

After the works had been in operation for a few months it was found that the entire output of the city could be burned in the daytime, the furnaces being charged at night and regulated to burn till morning. This made a big cut in the pay roll. The incinerator at San Francisco is the only one in the United States burning garbage and refuse without other fuel than the material itself. No artificial fuel of any kind can be used here; there is no place for it. All the other cities in the United States, incinerating garbage and refuse, have to use either coal, coke, wood, oil, or gas. Several of the English systems claim to burn without fuel, but in all of them it has been found necessary to use more or less fuel for the purpose of forcing a draught by means of a fan, which is not in use in the San Francisco works.

Since the work commenced in November the fires have never been extinguished; no repairs have been needed, but constant improvements are being made by the company in labor saving apparatus and in increasing the commercial value of the residuum. The works were built originally on low-lying ground covered at certain seasons of the year with water to a depth of from 2 to 3½ feet. The company has been using its ashes and clinker up to this time to fill in its own land and contiguous blocks, and it has found that, for the purpose of filling, the residuum has no superior; but the company is now about to erect fertilizing works, using its ashes as a base, and it is also considering the advisability of erecting works for the converting of the clinker into bricks and mortar. These experiments are being watched with much interest. The premises are kept in a neat and orderly manner. When the furnaces are charged at night, the material brought during the day has been wholly disposed of. There is an entire absence of smell and gases. Sanitary engineers from all parts of the country have visited this plant during the eight months it has been in operation. It has been indorsed highly by the State Board of Health of California and the San Francisco Board of Health, and the municipal authorities feel as if they had at last reached a solution of a sanitary disposition of the city's wastes.

THACKERAY INCINERATING AND FERTILIZING CO.,
411-413 BROADWAY, NEW YORK.

NEW YORK, *January* 29, 1900.

Dr. ALVAH H. DOTY, *Health Officer, Port of New York, Quarantine, S. I.:*

My Dear Sir.—Agreeable to your request, I send herewith some statements regarding the merits and advanced sanitary efficiency of the Thackeray incinerator.

You will observe that our system of incineration requires certain fundamental conditions in order to be a success. We burn all city refuse without the aid of fuel, consequently such waste must contain a reasonable amount of combustible material, and when any city adopts the system of mixing its wastes, it has, in one step, advanced to the highest standard of disposition.

But I consider it necessary to a proper understanding of this subject of sanitary garbage disposition to say a word in reference to those things which are closely allied to the disposing of garbage; for this is so vitally necessary that unless it does receive attention, and is adopted and incorporated into the disposal process, it will still fall short of achieving that which you have set out to do for New York city, to wit, the effectual sanitary disposal of municipal filth wastes.

For a great many years it has been the custom to require the citizens to separate kitchen garbage from the other forms of refuse on the totally false supposition that in doing so enough was accomplished to give completeness to the operation from a sanitary point of view.

For a long time cities and towns seemed to be contented with this, and for a time recognition was lost of the fact that in ashes, refuse, and litter which accumulated in the household and store were to be found conditions contributing as actively to the germination of disease as it was ever possible to say of garbage. The custom of separating city wastes was found to be very general, and citizens, seemingly unmindful of the fact that this custom of separating wastes, which obliged the citizens to provide separate receptacles, and thereby imposing individual expense upon the citizens, which, in a large city, would in the aggregate be in excess of what the most expensively constructed incinerator would cost.

The result of it all is, that the science of sanitation has moved above and beyond the advocates of fuel burning incinerators, which are able, mechanically, to destroy only one part of the city's wastes.

With us it is different. We contend that no process can make any sound pretensions to being sanitary short of a sound and rational commencement; and there is no other way to this than to indiscriminately co-mingle the wastes of the city, which all experts admit will retard putrefaction, neutralize offensive odors and preclude spilling from vehicles. Therefore, the sole justification and authority for the erection of a crematory are purely sanitary questions and conditions.

We could easily conceive of a situation where, notwithstanding the presence of half a dozen strictly fuel-burning garbage crematories, a city would still have much to do before it could justly claim to have a consummate sanitary system.

We maintain that to burn the garbage, and that alone, is many degrees short of a sanitary process. It accomplishes hardly more than half of what is necessary, and we submit that to ignore accumulations of household ashes, the filthy discarded rags, shreds of long-worn and unwashed garments, and the almost numberless putrescent odd and ends that daily accumulate in a city, is going scarcely more than half way along the road to sanitary accomplishment and sanitary reform; and I am persuaded that a careful consideration of the sanitary advantages of mixed collections will not be without its effect upon your mind whilst considering the problem of sanitary garbage disposition.

It must be admitted that everything that is an offense to the senses, whether it be ashes, rubbish, litter, sweepings, swill, or whatever else it may chance to be, has to be carted off, dumped, or disposed of somewhere; and it must be obvious to you that nothing will so certainly neutralize disgusting odors, nothing will more completely retard putrefaction, as to comingle all these wastes (garbage, ashes and all other filth products), and incinerate them together.

It is when thus comingled that the mixed wastes of cities are effectually incinerated by our process, leaving an ash and clinker residuum which is completely innocuous, and of such chemical character as leaves it a very valuable by-product—the fine ash as a base for mortar or fertilizer, and the clinker for brick making, for road dressing or filling, and other utilitarian uses.

The incineration of these mixed wastes is, by our process, effectually accomplished without the use of a single pound of fuel, other than that which the wastes supply, thus reducing the cost of incineration to the mere economic point of labor alone, which is a vital financial consideration for every city.

Our principle in the matter of construction is what may be styled the "Cellular" principle, as contradistinguished from the "Omnibus" method of construction, which is the principle seen in every type of fuel-burning furnace. Their reliance is upon the extreme intensity of heat engendered by the artificial fuels they employ. On the other hand, our reserve of air space gives our incinerator an enduring quality surpassing every form of fuel-burning furnace in the proportion of ten to one. This is a point of special significance to a city, particularly if they decide upon eventually becoming the owners and operators of the plant.

We will construct, equip and completely install Thackeray garbage incinerators of ample capacity to incinerate every accumulation of household and domestic, animal and vegetable refuse, ashes, waste, rubbish, sweepings, paper and general wastes, but excluding refuse from buildings in course of construction, unmixed earth thrown up from excavations, and ashes such as may be made by the trades and manufacturing concerns.

We guarantee further, that in the operation of cremation we will use no fuels other than those supplied by the garbage, ashes and wastes, as defined above; that the plant shall be successfully operated, and that the garbage and wastes, as defined, shall be thoroughly and satisfactorily destroyed, and let it be understood that the Thackeray does not use a forced draft.

We further agree that we will give a satisfactory bond to the authorities guaranteeing the requirements of specifications for the sanitary disposition of all wastes.

Permit me to conclude by saying that the officials of New York will be wise to turn a deaf ear to those who will seek to counsel a course opposite to a general comingling of the wastes. Rest assured it is the only genuine sanitary method, and it costs no more to collect, haul and deliver refuse to a crematory than it will to cart it to the city's environs; and, finally, let it be remembered that a Thackeray furnace will last an ordinary lifetime, whilst that of all fuel-burning furnaces is hardly beyond six to seven years.

This is the most weighty consideration, in case of eventual ownership by the city, and I feel persuaded it will not be lost upon you.

Further, we would agree, in case we erected a plant in New York, to keep such parts of our furnace as are affected by fire in repair without cost to the city for a period of five years.

Finally, the Thackeray process effectuates perfectly sanitary results, using in the process of incineration only such fuel elements as are contributed in the refuse mass constituting the deliveries, and power can be obtained from the burning of the refuse.

Believe me, Dr Doty,

Very respectfully yours,

C. F. JEWETT,

Manager.

Exhibit C.

Horsfall Destructors.

REPORT BY THE RIGHT HON. LORD KELVIN AND PROF. ARCHIBALD BARR.

In accordance with instructions from the Horsfall Furnace Syndicate, limited, we have made a study of their system of refuse destruction and utilization; and in order to make ourselves thoroughly familiar with the details of the system we have inspected the destructors at Edinburgh, Bradford and Oldham, making observations on the operation of these plants and obtaining information regarding their working from the municipal authorities of these centres. Further, with the assistance of Mr. J. D. Cormack, B.Sc., we made experimental observations on the working of the Bradford plant, and we carried out a careful test of twenty-four hours continuous working of the Oldham destructor.

We may say at once that we are convinced that the system is a thoroughly good one and that it embodies features which would lead us to expect unusually satisfactory results. We believe that the results actually obtained, as evidenced by the particulars given below, are exceptionally satisfactory. We would instance the special arrangements that are made for the maintenance of a high temperature as being a feature of great importance, alike from the point of view of the complete destruction of all noxious or deleterious matter and for rendering feasible the economic utilization of the heat produced.

In none of the three plants which we inspected is the heat generated as fully utilized as it might be—the plants were not put down with a view to the complete utilization of the heat produced. We would recommend to local authorities the careful consideration of the economic aspect of the problem. With such town refuse as is treated at Oldham we consider that it should be easy to obtain a steam production equivalent to the evaporation of one and one-third pounds of water from and at 212° F. per pound of unscreened refuse treated, and we believe that, in a plant designed to utilize the heat to the fullest extent, an evaporation of one and one-half pounds of water per pound or even more could be reached; and that without in any way affecting the perfection of the process from a sanitary point of view. These figures show that the Oldham refuse has a fuel value of about one-seventh that of good steam coal.

Figs. 1 and 2 represent, in a somewhat diagrammatic manner, the general arrangement of the furnace. Fig. 1 shows the independent cell type as built at Oldham, while fig. 2 represents the arrangement of two cells back to back as used at Edinburgh and at Bradford. The details of construction are necessarily modified in accordance with the requirements of the site and other conditions peculiar to particular installations. It will be seen that the charging hole is situated at the back of and above the furnace, while the flue for the emission of the gaseous products is situated over the dead-plate in front. This construction ensures that the gases distilled from the raw material must, on their way to the main flue, pass over the hottest part of the furnace, and be brought at the earliest possible time into contact with the intensely hot gases arising from the combustion of the previously dried and now incandescent material which has been raked over the grate bars and is burning there under forced draught.

A second important feature in this connection is the use of steam jets to produce the forced draught. The steam so used is condensed by contact with the cold air which it injects, and the water thus produced is re-evaporated in contact with the furnace bars, keeping down their temperature. In this way the life of the furnace bars is greatly increased. A more important function is however fulfilled by the steam. In coming into contact with the incandescent fuel it is decomposed, the hydrogen being freed while the oxygen combines with the carbon in the fuel to form carbon monoxide. This decomposition of the water is affected by heat abstracted from the lower part of the fire where it can be of comparatively small value for the cremation of the distillate. The "water gas" (hydrogen and carbon monoxide) passes upwards to be burned by the excess air which it meets with over the fire, thus serving to increase the temperature which would otherwise exist at the meeting of the products of combustion with the gases distilled from the raw material.

The gases next pass through flues, the walls of which are constantly maintained at a glowing temperature. The effect of the hot brickwork was well illustrated by observations which we made on the Bradford plant. In watching, through the open clinkering door of a cell, the operation of raking forward a charge onto the grate bars, dense smoke, as might be expected, was observed; but on looking through a sight hole at the end of the main flue no trace of such smoke could be seen issuing from the discharge end of the cell flue, and only the faintest trace of discharge (probably consisting largely, if not entirely, of steam) was observable at the chimney top. The absence of any hydrocarbons from the products of combustion as shown by the analyses given below of flue gases collected at Oldham, may be taken as a further indication of the completeness of the destruction of all organic matter in the plant tested.

No coal or coke is required for the cremation of the gaseous products issuing from the Horsfall cells. The use of fuel for this purpose with some forms of destructors leads to a large additional item in the cost of treatment of refuse, and may even then be far from successful in accomplishing the desired object—as was proved in the case of the destructors formerly in use at Edinburgh. Even when the fires of the Horsfall destructor are banked over Sunday it is found that they can be maintained alive and operations recommenced on Sunday night without the addition of any purchased fuel.

Still another important feature is the arrangement by which (except in the very smallest examples) a number of cells—charged and clinkered in rotation—deliver their gases into one main flue. When the fire in one cell is green, the other cells are discharging hotter products, so that the temperature of the main flue is maintained sufficiently high to prevent any possibility of noxious vapors reaching the chimney. It is only after such mixing that the products of combustion reach the boilers. We are convinced that this is a most important matter, and that in no destructor plant should the products of combustion from one cell be taken directly to a boiler so situated that the gases can possibly reach the boiler surfaces before combustion is complete.

The provisions above enumerated for the maintenance of a high temperature in the region of the exit opening of the cells and in the flue leading therefrom renders sufficient a very moderate blast pressure. We are of opinion that it is indeed advisable to avoid the use of a blast pressure exceeding about one inch of water. The use of a high blast pressure in a destructor furnace in which cakes of clinker are produced leads unavoidably to the blowing of holes in the fire, unless the fire is very frequently raked over, and frequent raking, involving as it does the frequent opening of a working door, must lead to the carrying into the furnace of a large excess of air, and thus to a reduction of the temperature of the flues. Such reduction of temperature is in itself an evil from the sanitary point of view, besides reducing the economy in cases in which the heat is to be utilized. Frequent raking also adds greatly to the manual labor required for the process, and therefore to the cost of treatment.

Again, as a large amount of fine dust is contained in all town refuse, it is advisable to keep the blast pressure low, in order to prevent any important carriage of such dust to the chimney, even in cases where, as in the Horsfall destructor, a considerable height is provided over the fire to minimize the blowing of dust through the discharge aperture. Of course, the rate of consumption of a cell of given grate area can be increased by the use of a higher blast, and the treatment of a given quantity of material per day may thus be provided for at a smaller initial cost. High blast pressure and high rate of consumption can be maintained if desired in Horsfall cells as in cells of other constructions. We observe, indeed, that in trials of a Horsfall destructor at Leeds, Dr. Cameron, of that city, found that 26¾ tons of refuse could be consumed per cell per day. But we believe that the Horsfall Syndicate are thoroughly justified in their contention that a high blast does not conduce to the efficiency of the furnace from the sanitary point of view, or to a lowering of the cost of treatment when working expenses are included, nor yet does it conduce to economy in the utilization of the material for purposes of power production.

Still another important point is the maintenance of energetic combustion (by aid of the hot brickwork over the fire) with slight chimney draught. Indeed, the ideal condition would be to have just a balance of pressure in the cell during clinkering operations, when the steam blast is shut off, so that no rush of cold air would take place through the flues while the clinkering door is open. We observed that in the Horsfall furnaces which we inspected, this condition is very closely fulfilled, and must be an important factor in the maintenance of the glowing red heat of the crown of the furnace which we observed in all instances during our inspections.

A novel feature of the Horsfall cells is the provision, at the sides of the furnaces, of cast iron boxes, through which the blast air is taken on its way to the grate. No doubt these boxes, to some extent, effect a heating of the blast, but their chief use is to prevent the adhesion of clinker to the side walls of the cells. In the absence of such a provision, destructor cells, in which a high temperature is maintained, rapidly deteriorate; possibly partly because of a direct chemical action, but mainly through the necessity for continually breaking off the adhering clinker, and so damaging the brickwork as ultimately to undermine the side walls. The iron boxes seem to be thoroughly effectual in preventing this trouble.

We consider the special arrangement of charging-hole at the back and clinkering door at the front of the destructor to have important advantages. It provides for the entire separation of the charging platform from the clinkering floor, and this gives great facilities for the storage of the surplus refuse during the hours of maximum delivery, while it leaves the whole range of clinkering doors in one line free for the operations there to be performed. Moreover, from the charging-hole the operator can see right through to the front of the fire so that the working of the whole cell is under his observation, and the operator at the front of the furnace, who has also a clear view, has only, in spreading a new charge over the fire grate, to rake it directly towards himself, thus involving a minimum amount of labor.

With these features in view we are not surprised to find that the cost for labor in stoking and clinkering the Horsfall furnaces at Bradford works out at the very low figure of 6d. per ton of refuse treated. At Oldham where higher wages per hour are paid, the cost of labor is about 9d. per ton.

We are convinced that properly constructed plants, such as those inspected at Edinburgh, Bradford and Oldham, cause no inconvenience whatever. The absence of smoke is such as is attained in exceedingly few, if in any, power plants using coal as fuel; while the complete destruction of organic matter is secured by the provisions above described. Destructors of the Horsfall type may be located in populous districts without danger to health or comfort. The expense of cartage may thus be reduced to a minimum, and further, the inconvenience which must arise if all the refuse from a large district is taken along one thoroughfare to a destructor in the outskirts may be avoided.

DESTRUCTOR AT POWDERHALL, EDINBURGH.

We visited the destructor on February 19, 1898. It consists of 10 cells in two rows of five, back to back. The furnaces were originally constructed on the "Fryer" system with back exhaust, and fitted with fume cremators. In an action raised in the Court of Session by the proprietor of an adjoining estate, it was proved that noxious gases and dust were emitted from the chimney in such quantities as to cause nuisance. The court remitted to Mr. Benjamin Hall Blyth, M. Inst. C. E., Edinburgh, and Dr. Odling, professor of chemistry in the University of Oxford, to visit the premises and to report to the court what changes, if any, were necessary to render the working of the destructors inocuous. Following upon the report submitted, the Horsfall Company were called in to reconstruct the furnaces, and the work was completed some 12 months before the date of our visit.

The principal feature of the plant as it now stands—over and above those referred to in the general description already given—is a dust collector, patented and constructed by the Horsfall Company. It consists of a circular brickwork building about 16 feet internal diameter and 12 feet internal height, lined throughout with fire-brick. In the center of this is built an inner cylindrical chamber, 5 feet 8 inches internal diameter, communicating with the surrounding annular space through arched openings at the top of the separating wall. The main flue from the destructors enters the annular chamber tangentially at the bottom, so that the gases have to pass around and upwards through the annular space before they enter the central chamber, from the bottom of which again they pass off to the boiler or to the bye-pass flue, as desired. The annular chamber is partially obstructed by the entering flue, the bye-pass flue, the boiler flue, and a rake passage communicating with the central chamber; the spaces between these obstructions form pockets in which the dust, carried outwards by centrifugal action from the whirling gases, may be quietly deposited. Each of the pockets is provided with a cleaning door, through which the dust may be drawn.

At our request, Mr. Cooper, the city engineer, caused the dust intercepted during the week ending March 13, 1898, to be measured, and found it to be in bulk 53 cubic feet. This may serve at once to indicate the efficiency of the design and the need for such an appliance in the case of Edinburgh, where the refuse is collected dry every day and is very light and dusty in character. Mr. Cooper has kindly furnished us with particulars with regard to the weight and bulk of the refuse. It appears that the bulk per ton is very variable, but we estimate that the mean bulkiness throughout the year may be taken at from 70 to 80 or more cubic feet per ton, showing that it is of an exceptionally light character. The dust from the collector is perfectly clean and free from soot—as might be expected from the high temperature at which the plant operates. It closely resembles finely ground reddish fire-brick.

We had not with us, on the occasion of our visit, an electric pyrometer, which we believe to be the only thoroughly satisfactory means of measuring such temperatures as exist in destructor flues, but we inserted a metallic expansion pyrometer into the dust collector, and we found it to indicate just over 1,600° F. We also inserted three metal discs having melting points respectively of about 2.000°, 1,800° and 1,100° F. On withdrawing the wire on which the discs were strung after one minute's exposure we found the last of the discs gone but the others intact.

We also observed that the discharge from the chimney was almost wholly invisible; only the faintest trace of whitish "smoke" was perceived. The slight discharge detected on close observation of the chimney no doubt consisted largely, if not entirely, of vapor produced by the recombination of the elements of the decomposed steam from the jets and from the wet materials treated. We had two photographs of the chimney taken in our presence and copies of these—certified by the photographers to be entirely "untouched"—are hereto annexed. No trace of smoke is indicated on the photographs. We understand that all ground for complaint has been entirely removed by the reconstruction.

No attempt is made to utilize the heat from these furnaces further than to raise the small quantity of steam necessary for the operation of the destructors themselves and for producing electric light for the premises.

THE BRADFORD DESTRUCTORS.

The destructors at Hammerton street, Bradford, were visited on the evening of May 3, 1898, and again on May 4th.

The installation here consists of 12 cells, which were erected to replace 12 cells of the "Fryer" type having back exhaust. The new cells are arranged in two groups of six cells, in lines of three, placed back to back, having one charging hole common to two cells.

These furnaces, we understand, represent the latest type constructed by the Horsfall Company, and we noted that in many details they showed great improvements over earlier examples. More especially, we would instance (1) the single clinkering doors of exceptional width, giving most convenient access for the working of the cells; (2) the manner in which these doors are suspended (instead of being hinged) which removes the inconvenience to the operator caused by radiation from the hot brick linings of the doors, and (3) the general arrangement and construction of the ironwork of the furnace front, which is of the most workmanlike and substantial character, both in design and execution. These features are well shown in the accompanying photograph.

The gases from the main flue pass through two multitubular boilers. These, however, have not sufficient heating surface to utilize the heat completely.

An examination of the superintendent's books, giving the records over a considerable period, shows that the mean rate of working is about 650 tons per week, or say 10 tons per cell per working day.

The muck treated is of a very unpromising looking character, and is in itself a proof of the necessity for an efficient system of destruction. It consists of damp ashpit refuse, containing a large proportion of nightsoil and of vegetable refuse from the market and from shops. It measures about 40 cubic feet to the ton. The nightsoil amounts—on the estimate of the superintendent—to 40 per cent. of the whole, and the green vegetable refuse to 5 or 6 per cent. The treatment of such material, with an absence of anything of the nature of nuisance is sufficient to prove the capability of the Horsfall furnace to deal with any quality of town muck likely to be met with.

Observation through a sight hole at the end of the main flue showed that the whole length was at a glowing heat. A thermo-electric pyrometer recorded a temperature of 1550° F. for the gases in the main flue, but the superintendent states that "for two nights previous to (our) visit, the collecting carts had been at work in one of the poorest districts in the city * * * * in which the refuse is of the very poorest calorific value. At no time during (our) visit was there anything approaching (the) usual working temperature."

Observations of the chimney showed here, as at Edinburgh, only a faint trace of whitish "smoke," becoming invisible at a very short distance from the chimney top.

A portion of the steam produced is utilized on the premises for supplying the steam jets, driving mortar mills, and for the electric lighting of the works, while another portion is supplied to an adjoining fish refuse manure factory. Even with the small amount of boiler power provided, steam was continually blowing off. We would judge that 400 H. P. could be generated continuously from this destructor.

We were informed by the superintendent that as much as £545 had been spent here in one year for coke for the cremation of the gases previous to the introduction of the Horsfall system; but since the starting of the present plant this expenditure has been entirely avoided, while undoubtedly these destructors are operating in such a manner as to cause absolutely no nuisance.

The clinker and ash produced amount in weight to about 30 per cent. of the material treated. We are informed by Mr. McTaggart that the whole of this clinker and ash is now utilized, none having been taken to tips for about three years. From 100 to 150 tons are used per week (or, say, two-thirds of the whole) for the manufacturing of mortar, which finds a ready sale—the output for the year ending 31st March, 1897, was 6,000 tons. The remainder of the clinker and ash is passed through a breaking and grading machine, and sold to contractors and others at 8d. per ton—lifted and removed by the purchaser. The revenue from these sales for the year ending 31st March, 1897, is given as:

Mortar	£1,202	11	10
Clinker	105	14	0
Old iron and tins	77	12	0
	£1,385	17	10
Less for lime used for mortar	395	3	0
	£990	14	10

For the year ending the 31st March, 1898, the revenue will be much larger as the amount of mortar sold has been 8,000 tons, as against 6,000 tons, on which the figures given above are founded.

OLDHAM DESTRUCTOR.

We visited Oldham on the afternoon and evening of 4th May, and on the 5th and 6th of May, we carried out a continuous test of the plant extending over 24 hours.

There are here 10 cells, one battery of six and another of four cells. We are informed that the battery of six cells which is shown in the accompanying photograph, was set to work in February, 1891, and worked continually for 17 months without interruption. They were then improved in certain respects and restarted in September, 1892, and worked uninterruptedly for two years and10 months. The group of four cells was set to work with a temporary connection to an old chimney in December, 1894, and during 1895, an old multitubular boiler, which had been worked in connection with all the cells, was removed, and a Lancashire boiler, eight feet diameter and 30 feet long, built for a working pressure of 140 pounds per square inch, was substituted. In February, 1896, further additions, including an economizer, were brought into use, while another Lancashire boiler, a duplicate of the former one, was introduced, at the expense, we understand, of the electric lighting department of the corporation, to whose station adjoining the destructor it now supplies steam at the rate of some 120 indicated horse-power. It will be observed that the six cell group has been in work—with certain interruptions—for over seven years, while the four cells have been practically in continuous operation for three and a half years, and no repairs of any moment have yet been necessary.

The muck at Oldham consists principally of cottage ashes (from exposed ashpits) fish offal and market garbage, and it measures on an average, 50 cubic feet per ton.

Besides supplying steam to the corporation electric lighting station, as above indicated, the plant supplies steam for heating food and driving the wheelwright's shop in the horse and provender department. The latter small application alone, we are informed by Mr. Alderman Waddington, mayor of Oldham, saves the corporation £60 a year in fuel, besides the time of a stoker. Some power is also utilized for the manufacture of mortar from clinker and lime, about 15 tons of clinker being used in this way per week. The sale of mortar so produced brings in a revenue (after paying for the lime required) of some £215 per annum.

Continuous observation of the temperature of the main flue from the four newer cells were made by means of a thermo-electric pyrometer. These observations extended from 10.50 p. m., of the 5th May, to 2.5 a. m., of the 6th May, and from 4.40 a. m. till 7.20 a. m., of the 6th May. It may be proper to state here that some of the methods usually adopted for measuring such temperatures are quite untrustworthy, and that the thermo-electric pyrometer is the most convenient apparatus that can be trusted to give reasonably accurate results.

The thermo-electric pyrometer gave a mean temperature of 1,643° F. with a minimum of 1,370° F. and a maximum of 1,875° F. The temperature in individual cells must have been considerably higher even than this. Observation of the temperature is the flue leading to the boiler at some distance beyond the six older cells indicated a somewhat lower temperature for these cells. They were made over a shorter time, and we had no access to the cells themselves for temperature observations.

The mean air pressure under the grates of the six cells was

1⅜ inches of water, and for the four cells ⅞-inch. How far the higher temperature in the case of the four cells is due to the improved construction, and how far due to the lower blast pressure, we are unable to say; but the result would appear to indicate an advantage from the use of the lower pressure, and at least demonstrates that a pressure under an inch of water is sufficient to give admirable results in cells constructed on the Horsfall system. We believe that the cells should be worked at a blast pressure of about one-inch of water in order to give the best results.

Samples of the gases were collected (over Mercury) from the main flues. As will be seen from the table below, some of these were collected slowly, so as to cover considerable periods of ordinary working, including clinkering, and others were taken in shorter periods while no clinkering was being done. These samples were submitted to Messrs. R. R. Tatlock and Thomson, city analysts of Glasgow, whose report upon their analyses is as follows:

156 BATH STREET,
GLASGOW, 17th *May*, 1898.

Analyses of five samples of gas received on the 10th inst., from Professor Barr.

	A.	B.	C.	Per cent. by volume.	
				I.	II.
Carbonic acid	8.60	15.50	18.10	8.50	13.30
Carbonic oxide	none	none	traces	none	none
Oxygen	10.90	3.90	1.40	10 70	6.30
Hydrocarbons	none	none	none	none	none
Nitrogen	80.50	80.60	80.50	80.80	80 40
	100.00	100.00	100.00	100.00	100.00

(Signed)

R. R. TATLOCK AND THOMSON.

Using the above analyses we estimate approximately that the amount of excess air used in terms of the air required for combustion is as follows in the various samples:

SAMPLE.	A.	B.	C.	I.	II.
Excess air in terms of necessary air.	1.13	0.23	0.07	0.70	0.43

The samples were taken as follows:

	Date.	Time.	Average Temp. F.	Remarks.
Four cell group:				
A.	5th	10.59 p. m.–11.33 p. m..	1505°	Clinkering in cells 3 and 4 occupying 18 minutes.
B.	6th	1.23 a. m.–1.54 a. m...	1600°	Clinkering in cells 4 and 1 occupying 20 minutes.
C.	6th	5.14 a. m.–5.46 a. m...	1730°	Clinkering as usual.
Six cell group:				
I.	5th	11.40 a. m.–12.25 p. m..	Not taken	Clinkering in two cells.
II.	5th	12.50 p. m.–1.00 p. m...	Not taken	No clinkering.

These analyses must be considered as exceedingly satisfactory. It will be observed that in no case was a measurable amount of carbonic oxide found, and only in one case were traces noted. Further, the proportion of carbonic acid is very large, and that of free oxygen very small. The small proportion of free oxygen —which means small excess of air—is to be attributed, on the one hand, to the avoidance of a high blast pressure, which would blow holes in the fire, and on the other to the small chimney draught, which would draw a large amount of air through the furnace during the operation of clinkering.

The absence of even traces of hydrocarbons shows that in all cases the furnace was completely destroying the gases distilled from the refuse, while the absence of carbonic oxide shows that the combustion of the carbon was complete. This is a most satisfactory result, especially when coupled with the small amount of excess air above noted.

The result of the combustion and evaporation tests are given in the table on page 82.

The storage space for refuse was not found sufficient to enable us to have supplies for the batteries of six cells and four cells respectively kept separate, so that the amount consumed in each battery was not determinable. The figures given on page 82 for the refuse burned in the two batteries separately were obtained on the assumption that the rate of combustion per cell in the battery of four cells was the same as that in the battery of six cells. There seems rather to be a likelihood that the combustion was slower in the four cells than in the six, since the draught was considerably less, so that the evaporation figure given for the four cells should probably be increased to show the best return in steam that can be obtained per pound of the muck treated at Oldham.

The more efficient evaporation for the battery of four cells seems to point to the conclusion that, from the steam raising point of view also, it is preferable to work with a very moderate forced draught.

KELVIN,
ARCHIBALD BARR.

August 10th, 1898.

RHODES BANK DESTRUCTOR, OLDHAM.

Date and duration of trial: 8 a.m., 5th May to 8 a.m., 6th May, 1898. Twenty-four hours.

	Four-cell group.	Six-cell group.	Total.
Refuse consumed in lbs.	71,320*	106,980*	178,300 (79.6 tons)
" " " per cell per 24 hours	17,830*	17,830*	17,830 (7.96 tons)
Clinker and ashes produced in lbs	......	......	56,690 (26.2 tons)
Proportion of clinker and ashes produced to refuse burned	......	......	32.9%
Average boiler gauge pressure in lbs. per sq. in.	128	128	......
Average temperature of feed water	57°F.	57° F	......
Water evaporated in lbs	78,900	78,100	157,000
Equivalent evaporation in lbs. of water from and at 212° F	95,100	94,100	189,200
" " per cell per 24 hours	23,800	15,700	18,900
" " per lb. refuse	1.33*	0.88*	1.06 tons (average)
Temp. of gases before passing through economiser	......	......	700°F.
" " after " "	......	......	555°F.
Air consumption per lb. refuse calculated (approximately)	25.8 c. ft.* (1.96 lbs.)	28.6 c. ft.* (2.16 lbs.)	27.5 c. ft.* (2.08 lbs.)
" " per cell per hour " "	18,650 c. ft.* (1,410 lbs.)	20,620 c. ft.* (1,560 lbs.)	19,830 c. ft.* (1,500 lbs.)
Average draught in ashpit in inches of water	⅞	1⅜	......

* See page 14.

HAMMERTON STREET DESTRUCTOR, BRADFORD, AND RHODES BANK DESTRUCTOR, OLDHAM.

The following table has been drawn up from information kindly supplied by Mr. McTaggart, the Superintendent at Bradford, and Mr. Jessop, the Superintendent at Oldham.

	Bradford.	Oldham.
Number of cells	12	10
Number of stokers and weekly wages	8 at 28/-	12 at 30/-
" " fillers " " "	4 at 25/-	
Number of boiler and mortar mill attendants, and weekly wages	2 at 28/- 1 at 23/-	1 at 27/- 1 at 24/-
Extra man at mortar mill occasionally employed	6/-	....
Total wages of furnacemen per week	324/-	360/-
Total wages of furnace, boiler, and mortar mill men per week	409/-	411/-
Hours of work of furnacemen per week	66	48
Shifts of furnacemen per week	5 of 12 hours 1 of 6 hours	6 of 8 hours
Time of working destructor per week	(Start) Sunday midnight (Finish) Saturday noon	Sunday 10 p.m. Saturday 10 p.m.
Hours of working the destructor	132	144
Frequency of clinkering of each cell	Every 1½ hours	Every 2 hours
Average amount of muck burned per week	650 tons	480 tons
Rate of working of each cell per 24 hours	10 tons	8 tons
Average bulk of muck in cubic feet per ton	40	50
Cost of labor of furnacemen per ton	6d.	9d.
" " " boiler and mortar mill men per ton	7½d.	10¼d.

NEW YORK, *February* 6, 1900.

DR. DOTY, *Health Officer, Port of New York, Office of Quarantine Commissioners, No.* 11 *Broadway, New York City:*

Dear Sir.—Allow me to submit to you the following:

Refuse burned at Bradford, England, consists of house ashes, kitchen garbage, condemned fish from the market (large quantities) and about a third of the whole refuse dealt with is excremental matter from old fashioned privies, the water carriage system not being yet fully adopted in that city. The British refuse consists of generally 33 per cent. of moisture, 30 per cent. of incombustible matter, the latter being fused and coming away in the form of clinker; the fine ash which falls through the bars is in our furnaces an extremely small quantity. The remaining 36 per cent. is combustable matter and is entirely oxidized in our furnaces.

Twelve cells at Bradford are burning 120 tons of refuse per day of 24 hours continuously, Sundays excepted, at a cost for labor of a fraction under 12 cents per ton, and the results as to steam raising are so good that it has been decided to put down at the destructor, machinery for making concrete paving slabs from clinker. On the continent of Europe we frequently have to deal with refuse of which 60 per cent. is incombustible matter.

At Huddersfield, England, which is burning sewage sludge containing about 70 per cent. of water, mixed half and half with ordinary house refuse, our destructor is burning ten tons per cell per 24 hours of this mixture, at a cost of labor of under 15 cents per ton.

The garbage at Bradford is about 80 cubic feet to the ton; at Edinburgh, Scotland, about 40 cubic feet to the ton.

By having the number of cubic feet per ton and an accurate description of the composition of garbage, a very close and accurate comparison of results that can be obtained can surely be demonstrated, because, under so many different conditions, Horsfall furnaces are now demonstrating results which are hard to believe, but can be seen by any who do not believe.

Pardon me for further rehearsal of what you may have already gathered from the pamphlets on "Horsfall" destructors and which you have seen in operation at Hamburg, but I wish to call your attention to the main features, which are: A number of small cells as compared with one large cell. By having the separate cells and attaining very high temperature by forced draft steam or air, any gases which escape from any one cell are destroyed by the united high temperatures from the other cells. The furnaces are fed from the top, which is always closed tight; it descends gradually, drying as it falls forward onto the grate. The doors of ash pits and grates are air tight and resist the forced draft,—the only escape to the air being by the chimney. The improvements of the application of this forced draft by the Horsfall system have brought about the good results; previous to these improvements it was on a level with other forced draft furnaces.

Under these conditions a thoroughly sanitary destruction of garbage is accomplished.

If the collection of garbage was made by covered cans set out by ten o'clock at night and collected during the night, as is done in European cities, the removal would be much less offensive to the community.

By mixing ashes with garbage, moisture is absorbed and mechanically separates the wet mass of kitchen garbage and aids in destruction by cremation.

A most important feature of the construction of the Horsfall furnaces is their simplicity which permits strong details, making the tear and wear very slight and expense for repair a minimum. High temperatures are necessary for both sanitary and economical destruction and much mechanism means rapid exhaustion of the apparatus.

I believe that there is much expense connected with corrosion of parts of apparatus for disposing of garbage by reduction process, and it is not always counted against profit.

I hope to have the favor of waiting upon you and if you wish show you the detail, plans and photographs of the furnaces in operation in Great Britain, which I have.

Respectfully,

HEW MILLER,
Agent.

NEW YORK, *February* 16, 1900.

Hon. A. H. DOTY, M. D., *Health Officer, Quarantine, S. I.:*

Dear Sir.—Enclosed please find rough sketch of 350-ton plant of "Horsfall" Destructors, composed of six batteries of six cells each, taken at about ten tons per cell. I estimate the cost of one six-cell plant at $12,500, which for a plant of six batteries would be $75,000. For a two hundred and fifty ton plant, four batteries would be $50,000.

On so short notice I have not had sufficient time to study out this as I should like, but hope that this will be sufficient for your use at present. These prices are for concrete foundations, built on ground. If on timber grillages on piles under water, which is the usual way of constructing bridges of heavy weight, this could easily be done. For this add about $10,000. In this way the plant could be built in water. The large amount of ashes could be disposed of to make land all around this plant. 155x120= about seven and one-half lots 25x100; $10,000, gives about $1,400 a lot if the plant is built on foundations under water.

Referring to my previous letter regarding what is done at Huddersfield, England, I would again call your attention to what is done there at under 15 cents per ton.

The same results can certainly be obtained with these furnaces in this country as in Europe and no doubt the garbage and refuse can be brought together to give the same composition of garbage as is being destroyed in Europe.

Yours respectfully,

HEW MILLER.

Exhibit D.

[Extract from "Evening Telegram," Providence, R. I., May 30, 1899.]

Disposal of City's Garbage.

CONSIDERABLE INTEREST BEING SHOWN IN THE MATTER BY OFFICIALS AND CITIZENS. — TWO SYSTEMS SUGGESTED. — ONE BY CREMATION AND THE OTHER BY EVAPORATION, THE FORMER DISPOSING OF ASHES.

It is probable that the question of the collection and disposal of the city's garbage will be one of the vexed questions that the board of aldermen, acting as a board of health, will be called upon to consider during the coming summer. Bids for the treatment of the garbage collected in this city have been submitted, but as yet the board of health has not gained sufficient data upon which to form an opinion or to warrant its awarding a contract.

During the past week the board of aldermen made a visit to Syracuse, N. Y., for the purpose of inspecting the Holthaus system which is in operation in that city. As is well known, the system disposes of the garbage by evaporation, and if it were deemed best to dispose of the garbage in this city by evaporation, no doubt the Holthaus system would be as good and perhaps better than any other, but there are several systems in use in this country, which dispose of the whole wastes of a city, including all vegetable and animal matter, ashes, house-sweepings and refuse of all kinds by cremation, and many of the city officials and many of the tax-payers and citizens are of the opinion that if the city is going to adopt any system for the disposal of its garbage, it should adopt one that will take care of all the refuse matter, ashes included.

Syracuse is a city of about 130,000 inhabitants, and it pays the Holthaus Company $26,000 per year to dispose of its garbage. In addition to this the city has to pay for the collection and delivery of the garbage to the plant, which amounts to $15,000 or more annually.

The city of Providence pays 15½ cents per individual for the collecting and carting off of its garbage. If it should adopt the Holthaus system, and pay at the same rate as Syracuse does for the disposition of its garbage it would cost the city about $60,000 per annum. All these matters are worthy of careful study by the city council.

The Holthaus system is comparatively a new one, but a great deal has been said about it by boards of health and public officials interested in the elimination of the bad features of garbage handling.

The claim made by the owners of the Holthaus system is that garbage is transformed into fertilizer and soap-grease without odor, and that a large plant can be operated year after year in any locality where the collections can be shovelled from the wagons into the digesters without calling forth petitions for the abatement of unsavory smells.

A full description of the plant in operation in Syracuse was published in the "Telegram" last Thursday, and as stated at the time the cost of disposing of the garbage by this system appears to be pretty large, particularly when one takes into consideration the fact that this process only disposes of the garbage proper, leaving ashes, house-sweepings and general refuse to be taken care of as best it can.

Owing to the investigation by the city officials of the problem of garbage disposal, a description of the incinerator recently patented by Felix L. Decarie, of Montreal, Canada, will be of interest. The Decarie incinerator seems to possess all the sanitary and economical requirements, as the scientific construction of the apparatus provides for the disposition of offensive odors, for the cremation of the garbage without the use of coal or oil, and for the generation of steam power. The cut published with this article furnishes an illustration of the system, giving a side view of the complete incinerator. The furnace casing is built within the crematory building and upon a foundation below the floor line of the building. This casing is formed with a plurality of interior successively arranged cremating chambers separated from each other by vertical partition walls and extending transversely across the entire space of the casing from top to bottom and from side to side thereof. These vertical partition walls are spaced at regular distances apart to form the successive series of cremating chambers, and at their upper ends, next to the top of the furnace casings, there are flue openings which provide communication between the several chambers, and are designed to be covered and uncovered by means of cut-off dampers.

In each of the cremating chambers there is a pair of upwardly convergent tubular or hollow garbage-supporting grates, arranged transversely from side to side of the chamber. These grates incline upwardly towards the transverse centre of the cremating chamber and diverge from their upper adjacent ends to opposite lower sides of the chamber. These grates form an inverted V-shaped support for garbage, and their disposition forms between them and the adjacent walls the garbage cells, as indicated in the cut, into which the garbage to be incinerated is dumped. The tubes or pipes comprising the garbage-supporting grates are fitted at their upper end in the lower side of an upper centrally-arranged distributing header-drum extending transversely across the cremating chambers and projecting through the opposite side walls of the furnace casing. The opposite ends of this distributing header are fitted to the lower ends of the oppositely arranged steam conducting pipes, provided with suitable valves and connected at their upper ends with the steam-drums arranged longitudinally above the furnace casing at opposite sides thereof, to provide for the pipe connection with the projecting ends of the distributing headers within each of the series of the cremating chambers. It will therefore be seen that the upper oppositely arranged steam-drums serve to collect and store the steam generated within the tubular garbage-supporting grates of each cremating chamber, and by means of suitable pipe connection, steam may be conducted to an ordinary steam engine or utilized for other power purposes. The object of the pipe connections heretofore described is simply to utilize the heat within each cremating chamber for generating steam and storing same for power purposes.

From their connections with the lower side of the distributing headers the grate tubes or pipes in each cremating chamber diverge downwardly to opposite sides of the chamber, and near their lower end are angled to form a rest for supporting the body of the garbage, which has a constant tendency to slip downward within the cells, and to cave in as it becomes dried and is being consumed. The lower angled ends of the grate tubes or pipes are connected with water distributing drums arranged transversely within opposite sides of the cremating chamber, and having connected with their outer ends exterior to such chamber the water pipes, which furnish a supply of water to the drums in order that the pipes or tubes may be kept filled with water to prevent burning out, and at the same time to provide for a continuous generation of steam for power purposes.

Within the bottom portion of each cremating chamber, below the inverted V-shaped garbage-support, the furnace casing is formed with a pair of oppositely located fire-boxes arranged, respectively, at opposite side of a centrally disposed fire-wall built on the floor of the casing and extending well up into the space between the grates, in order to insure the deflection of the flame and products of combustion upward through the grates. At the opposite sides of the central fire-wall are arranged oppositely located fire-grates, below which grates are formed the ash-pits with which communicate the door-enclosed ash-pit openings formed at opposite lower sides of the furnace casing, and said casing is also provided with ordinary fire-doors at opposite sides, which cover openings communicating with the fire-boxes over the lower grates whereby ready access may be had to the fires on the grates for stoking or otherwise attending to the same. Connecting with the pair of fire-grates within the bottom portion of each cremating chamber there is formed in the bed of the furnace casing open conveyor pits, extending longitudinally the entire length of the crematory and communicating with the interior thereof at the bottom, so as to receive the ashes and clinkers as they fall or are raked from the fire-grates. These open longitudinal conveyor-pits have arranged therein endless conveyor-aprons, and fitted within each open conveyor-pit, under the upper portion of the conveyor-aprons, is a separating sieve which serves to hold thereon clinkers and ashes, while the finer portions of the ashes are allowed to sift through into the bottom of the pit, so as to be conveyed in one direction by the lower portion of the apron, while the clinkers and ashes on top of the sieve are conveyed in the opposite direction by the upper portion of the apron.

While the several cremating chambers communicate with each other through the damper-controlled flue openings, each of the chambers have formed in the top thereof separate oppositely located flue openings, in which are fitted the lower ends of the oppositely arranged branch flues or pipes, having elbow connections at their upper end with opposite sides of a common escape flue or pipes, arranged longitudinally above the furnace casing to provide for the branch flue connections therewith from each cremating chamber, and fitted at one end in the top of the furnace casing, so as to communicate with the upper end of the vertical end draft-flue. The flue is formed vertically within one end of the casing and communicates with the last cremating chamber of the series, and said vertical flue extends to the floor of the crematory to form within its lower end a dust pit, and directly above this dust-pit the draft-flue opens into an escape passage, communicating with a scent-consuming furnace, built at one end of the main casing and provided with a fire-grate, on which is maintained a fire for consuming the odors that may be carried with the hot gases through the furnace.

Under ordinary conditions, when all of the cremating chambers are in operation, the dampers in the pipes are closed so as to compel the heat and other products of combustion to pass from one cremating chamber to another through the flue opening, and by reason of this circulation of the hot gases and other products of combustion, the gases of one cremating chamber are consumed in the next succeeding chamber, so that when the cremating chambers are thus operated in series very little, if any, odor passes out of the end draft-line into the scent-consuming furnace, although it will be understood that whatever scent or odor may be carried out of the last cremating chamber will be disposed of by the fire in the scent-consuming furnace.

The furnace casing is provided on opposite sides thereof with a plurality of door-inclosed cell openings, communicating with the garbage cells to permit of access for the purpose of removing incombustible matter and also to permit the stoking of the garbage. Above the plane of the door-inclosed openings the furnace casing is further provided on opposite sides thereof with door-inclosed opening to permit of garbage being dumped into the cells for incineration. It will be observed that the series of feed-openings are arranged above the plane of the road-ways or dump floors built on supporting girders within the crematory building on opposite sides of the furnace casing. These road-ways or dump-floors run along each side of the furnace casing, and are extended at their ends into inclined approaches, which lead from the road or street into the ends of the crematory building, so that the garbage carts or wagons can be driven directly onto the road-ways or floors, and the contents thereof dumped into the cells of the cremating chambers.

These road-ways or dump-floors also extend along the opposite sides of the auxiliary heater casing, built at one end of the main furnace casing, next to the first cremating chamber of the series. The auxiliary heater casing essentially comprises inner and outer metallic shells, connected by intermediate fastening stays, so as to confine there-between a steam jacket, with which communicates one end of steam conducting pipes, provided with suitable cut-off valves and connected with their upper ends with one end of the steam drum to provide means for constantly circulating the highly-heated steam throughout the hollow end of the casing, so that the radiated heat of such casing will assist in drying the garbage that is introduced into opposite sides thereof through the feed openings.

The heater casing is provided in opposite lower sides thereof with a plurality of discharge openings, communicating with adjacent open sides of conveyor boxes, arranged longitudinally of the entire crematory on opposite sides thereof. The portions of the conveyor boxes extending along opposite lower sides of the auxiliary heater casings are preferably provided with screen bottoms, below which are formed short deflecting chutes, extending through the side walls of the auxiliary heater casing below the plane of the openings, so as to discharge the material screened through the bottom back into the bottom of the heater casing.

At one end of the heater casing opposite longitudinal conveyor boxes are provided with short upwardly inclined portions, which prevent the elevation of liquid matter into the horizontal portions of the boxes extending along opposite sides of the furnace casing, and arranged to travel within the boxes the entire length thereof, are endless conveyor aprons, the upper portions of which are supported for travel on rollers, while the lower portions travel on the bottom of the boxes and drag the garbage along therein to the feeding hoppers, connected with the bottoms of the boxes, and extend laterally into the side walls of the furnace casing over the grate fires therein, so as to deliver dried garbage to such grates as fuel. Each conveyor box extends beyond one end of the furnace casing, and opens at such ends into the lower end of an upwardly extending elevator spout. The elevator spouts for the conveyor boxes are convergently arranged at one end of the furnace casing and communicated at the upper end with the interior of a distributing box, arranged longitudinally above the furnace casing. The elevator spouts are provided with endless elevating belts or aprons, which serve to elevate the garbage delivered into the lower ends of the spouts into one end of the distributing box. There is an endless distributing apron or belt in the distributing box which drags the garbage along at the bottom of the box, which is provided at intervals with bottom discharge openings, having short chute connections with top feed openings formed in the top of the casing at the central point of each cremating chamber.

The garbage which is dried in the auxiliary heater is employed for fuel and distributed to the different cremating chambers in the manner described, but certain garbage which is delivered to the crematory may be in such a condition as to be immediately available for use as fuel, and to provide for utilizing garbage in this condition incline feed chutes are arranged in pairs respectively, at opposite sides of the furnace casing below the roadways or dump floors.

The generation of steam power, the burning of the garbage without the use of other fuel, and the automatic separation of clinkers and ashes are some of the notable features of the Decarie system, and they are very important considerations. The steam power made by the operation of such an incinerator could be utilized by many municipalities for running water or electric light plants, and a great saving could be effected thereby. The ingenious arrangement for conveying the garbage from the drying chambers to the cremating chambers is a labor-saving feature of much importance. Another point favorable to the Decarie furnace is the absence of the down-draft, thus obviating the frequent burning out of grate-bars, which seems to be quite an item of expense in the operation of other garbage crematories.

In the current number of the Municipal Engineering, there is an interesting article on the "Utilization of city refuse," from the pen of W. F. Morse, who has made a careful study of the disposal of garbage for many years, and who is considered an expert on the subject. Mr. Morse says:

Four years ago a statement was made by a distinguished English scientist to the effect that the waste produced by each inhabitant of a city was sufficient, when properly burned, to supply each individual with an electric light of eight candle power for two hours every night in the year. At the time this was thought to be a somewhat fanciful assertion and impossible to be realized. But the development and progress of garbage and waste disposal by cremating furnaces, under varied forms and conditions, have proven that the statement is in a fair way to be demonstrated.

It is certain that the combustible waste which forms a considerable proportion of the whole collection of city refuse can be utilized or employed for fuel to destroy the organic matters, and thereby save a large percentage of the expense of disposal work as heretofore carried on.

City refuse may be roughly classed under three heads:

Organic, garbage and kitchen offal, bodies of animals, condemned foods, market refuse and putrescible matters of every kind, about 17 to 20 per cent.; combustible refuse, about 20 to 25 per cent.; inorganic, street sweepings, ashes, including broken glass and crockery, yard and floor sweepings, oyster and clam shells, and also trade refuse in large quantities, about 55 to 63 per cent.

When three separations can be made of the garbage, combustible refuse, ashes and street sweepings taken together, and when the first two items are brought together at one convenient point, there can be constructed disposal plants which shall destroy the garbage by utilizing the heat obtained from the worthless parts of the refuse at so small a cost as to make the work practically self-supporting.

The operation of the waste disposal plant just established in the city of Boston has shown that it obtains from the destruction of a comparatively small percentage of refuse sufficient heat to move all machinery required for its operating, heating and lighting, and also a large proportion of heat units that cannot at present be utilized.

It follows naturally that the extension of this principle to its utmost available limit and the utilization of these units of heat for the disposal of organic substances is not so difficult to be accomplished as was formerly supposed. There are two or three conditions which must be predicted in advance.

A separation of the garbage from ashes and refuse should be made. The garbage should be collected with not more than 10 per cent. admixture of foreign matters, and with as small an amount of liquid as is possible.

The refuse must also be separated from ashes and garbage and kept in a dry condition. It may include everything which enters into the household life of the people, excepting only kitchen offal and ashes. Under the usual separation in New York and Boston, it includes tin cans which are used for dry substances, as well as every class or grade of paper, cardboard, rags, empty bottles (excepting those for catsup or sauces), carpets, old shoes and rubbers, worn out or superfluous clothing, carpets and rags, broken or worthless furniture, boxes, barrels, excelsior mattresses—every discarded article that has been employed in the home life of the household, shops or factories.

To utilize the heat from the burning of material and apply it effectively for the cremation of organic waste has necessitated an entirely new departure in the art of constructing cremating furnaces; and this, after elaborate experimentation and great expenditure of time and money, has been successfully accomplished.

It has been demonstrated that the mixed material of city waste collections can be destroyed chiefly by means of its own fuel—with the use of a very insignificant amount of coal or wood to start the process. In a city where coal and wood are held at a price of $15 to $20 per cord and ton, and where a furnace has been in operation for two years destroying the mixed garbage and refuse of the community, no fuel has been required, with the exception of a few sticks of wood to begin the work. Therefore the problem of disposal of organic waste by utilizing the combustibility of the products cast off by the community has been solved.

That this process is practicable in the majority of American cities is certain; and that it can be done without objection on a sanitary score is positively determined by the use of approved apparatus for consuming the products of combustion. Every particle of carbon and smoke is converted into gas, and after being passed through a boiler, discharged in an almost invisible condition as it issues from the chimney. For several years there has been destroyed in the largest city of this country, on one of the main avenues, a quantity of garbage, offal and manure equivalent to one ton daily, without the slighest objection or complaint of nuisance from anyone in the building or the surrounding houses.

The employment of this system of destroying organic wastes by combustible refuse is certain to be adopted when thoroughly understood by the authorities of cities, because it is distinctly a step in advance of the present methods of employing fuel in large amounts and of throwing away the combustible refuse.

The development of the art of sanitation as applied to the disposal of waste and the prevention of infectious diseases by disinfection during recent years has been rapid and substantial. A review of the field in the United States demonstrates how much has been accomplished by the efforts of sanitary associations and the individual example of a few earnest men, united to the practical business methods of others who have engaged in the work as a profession or avocation.

It is claimed by the owners of the Decarie sanitary system that their process disposes of the whole waste of a city, including all vegetable and animal matter, ashes, house sweepings and refuse of all kinds. The garbage itself furnishes the fuel, it is claimed, and creates steam power to the extent of from two to three horse-power, per ton of garbage, which can be utilized for operating an electric light plant or any other municipal industry.

The board of health and the city council will do well to look into all these matters, and ascertain just what these various systems can and will accomplish before making a contract for the disposal of the city's garbage.

THE DECARIE GARBAGE INCINERATOR.

Owing to the growing investigation by the city officials of the problem of garbage disposal, a description of the incinerator recently patented by Felix L. Decarie, of Montreal, Canada, will be of interest. The Decarie incinerator seems to possess all the sanitary and economical requirements, as the scientific construction of the apparatus provides for the disposition of offensive odors, for the cremation of garbage without the use of coal or oil, and for the generation of steam power. The drawing published with this article furnish a complete illustration of the system. Fig. 1 is a side elevation of the complete incinerator. Fig. 2 is a central vertical longitudinal sectional view of the entire apparatus. Fig. 3 is an enlarged sectional view of one of the cremating chambers of the incinerator. Fig. 4 is a vertical transverse sectional view of the cremating chamber, showing its inclosure within the crematory building. Fig. 5 is a longitudinal sectional view of the drying chamber. Fig. 6 is a side elevation of a portable incinerator embodying the principal features of the invention. Referring to the accompanying drawings, the numeral 1 in Fig. 4 designates a furnace casing built of masonry and formed with an arched closed top portion. The furnace casing is built within the crematory building and upon a foundation below the floor line of the building. Their casing is formed with a plurality of interior successively arranged cremating chambers, separated from each other by vertical partition walls, as shown by numeral 5 in Fig. 3, and extending transversely across the entire space of the casing from top to bottom and from side to side thereof. The vertical partition walls are spaced at regular distances apart to form the successive series of cremating chambers, and at their upper ends, next to the top of the furnace casing, there are flue openings which provide communication between the several chambers and are designed to be covered and uncovered by means of cut-off dampers.

In each of the cremating chambers there is a pair of upwardly convergent tubular or hollow garbage supporting grates, arranged transversely from side to side of the chamber, as designated by the numeral 10 in the drawings. These gates incline upwardly towards the transverse center of the cremating chamber and diverge from their upper adjacent ends to opposite lower sides of the chamber. These grates form an inverted V-shaped support for garbage and their disposition forms between them and the adjacent walls the garbage cells, as clearly indicated by the numeral 12 in Fig. 3, into which the garbage to be incinerated is dumped. The tubes or pipes comprising the garbage-supporting grates are fitted at their upper end in the lower side of an upper centrally arranged distributing header-drum (13), extending transversely across the cremating chambers and projecting through the opposite side walls of the furnace casing. The opposite ends of this distributing header are fitted to the lower ends of the oppositely arranged steam conducting pipes (14), provided with suitable valves and connected at their upper ends with the steam-drums (16), arranged longitudinally above the furnace casing at opposite sides thereof to provide for the pipe connection designated by the numeral 14 in the drawings, with the projecting ends of the distributing headers within each of the series of the cremating chambers. It will therefore be seen that the upper oppositely arranged steam-drums serve to collect and store the steam generated within the tubular garbage-supporting grates of each cremating chamber, and by means of suitable pipe connections steam may be conducted to an ordinary steam engine or utilized for other power purposes. The object of the pipe connections heretofore described is simply to utilize the heat within each cremating chamber for generating steam and storing same for power purposes.

From their connections with the lower side of the distributing headers (13), the grate tubes or pipes in each cremating chamber diverge downwardly to opposite sides of the chamber and near their lower end are angled, as at numeral 20, to form a rest for supporting the body of the garbage, which has a constant tendency to slip downward within the cells and to cave in as it becomes dried and is being consumed. The lower angle end (20) of the grate tubes or pipes are connected with water distributing drums (21), arranged transversely within opposite sides of the cremating chamber and having connected with their outer ends exterior to such chamber the water pipes designated by numeral (22), which furnish a supply of water to the drums (21), in order that the pipes or tubes may be kept filled with water to prevent burning out and at the same time to provide for a continuous generation of steam for power purposes.

Within the bottom portion of each cremating chamber, below the inverted V-shaped garbage-support, the furnace casing is formed with a pair of oppositely located fire-boxes (23), arranged, respectively, at opposite sides of a centrally disposed fire-wall (24), built on the floor of the casing and extending well up into the space between the grates, in order to insure the deflection of the flame and products of combustion upward through the grates. At opposite sides of the central fire-wall are arranged oppositely located fire-grates (25), below which grates are formed the ash-pits (26) with which communicate the door-enclosed ash-pit openings (27), formed at opposite lower sides of the furnace casing, and said casing is also provided with ordinary firedoors (28), at opposite sides, which cover openings communicating with the fire-boxes over the lower grates, whereby ready access may be had to the fires on the grates for stoking or otherwise attending to the same. Connecting with the pair of fire-grates within the bottom portion of each cremating chamber there is formed in the bed of the furnace casing open conveyor pits (29), extending longitudinally to entire length of the crematory and communicating with the interior thereof at the bottom, so as to receive the ashes and clinkers as they fall or are raked from the fire-grates. These open longitudinal conveyor-pits have arranged therein endless conveyor-aprons (30), and fitted within each open conveyor-pit, under the upper portion of the conveyor-aprons, is a separating sieve (32) which serves to hold thereon clinkers and ashes, while the finer portions of the ashes are allowed to sift through into the bottom of the pit, so as to be conveyed in one direction by the lower portion of the apron, while the clinkers and ashes on top of the sieve are conveyed in the opposite direction by the upper portion of the apron.

While the several cremating chambers communicate with each other through the damper-controlled flue-openings (6), each of the chambers have formed in the top thereof separate oppositely located flue-openings (33), in which are fitted the lower ends of the oppositely arranged branch flues or pipes (34), having elbow connections at their upper end with opposite sides of a common escape flue or pipes (35), arranged longitudinally above the furnace casing to provide for the branch flue connections therewith from each cremating chamber and fitted at one end in the top of the furnace casing, as at numeral 36 so as to communicate with the upper end of the vertical end draft-flue (37). The flue 37 is formed vertically within one end of the casing and communicates with the last cremating chamber of the series, and said vertical end flue extends to the floor of the crematory to form within its lower end a dust pit (38), and directly above this dust pit the draft-flue opens into an escape passage (39), communicating with a scent-consuming furnace (40), built at one end of the main casing and provided with a fire grate (41), on which is maintained a fire for consuming the odors that may be carried with the hot gases through the furnace.

Under ordinary conditions, when all the cremating chambers are in operation, the dampers (34a) in the pipes are closed so as to compel the heat and other products of combustion to pass from one cremating chamber to another through the flue opening, and by reason of this circulation of the hot gases and other products of combustion, the gases of one cremating chamber are consumed in the next succeeding chamber, so that when the cremating chambers are thus operated in series very little, if any, odor passes out of the end draft-flue into the scent-consuming furnace, although it will be understood that whatever scent or odor may be carried out of the last cremating chamber will be disposed of by the fire in the scent-consuming furnace.

The furnace casing is provided on opposite sides thereof with a plurality of door-inclosed cell openings (43) communicating with the garbage cells to permit of access for the purpose of removing incombustible matter and also to permit the stoking of the garbage. Above the plane of the door-inclosed cell openings, the furnace casing is further provided on opposite sides thereof with door-inclosed feed openings (44), to permit the garbage being dumped into the cells for incineration. It will be observed that the series of feed-openings are arranged above the plane of the road-ways or dump floors (46), built on supporting girders within the crematory building on opposite sides of the furnace casing, as shown in Fig. 4. These road-ways or dump-floors run along each side of the furnace casing and are extended at their ends into inclined approaches (47), which lead from the road or street into the ends of the crematory building, so that the garbage carts or wagons can be driven directly on to the road-ways or floors and the contents thereof dumped into the cells of the cremating chambers.

These road-ways or dump-floors also extend along the opposite sides of the auxiliary heater casing (48), built at one end of the main furnace casing, next to the first cremating chamber of the series. The auxiliary heater casing, which is clearly illustrated by Fig. 5, essentially comprises inner and outer metallic shells (50 and 51), connected by intermediate fastening stays (52) so as to confine there between a steam jacket (54), with which communicates one end of steam conducting pipes (55), provided with suitable cut-off valves (59) and connected with their upper ends with one end of the steam-drum to provide means for constantly circulating the highly heated steam throughout the hollow end of the casing, so that the radiated heat of such casing will assist in drying the garbage that is introduced into opposite sides thereof through the feed openings (57).

The heater casing is provided in opposite lower sides thereof with a plurality of discharge openings (59), communicating with adjacent open sides of conveyor boxes (60), arranged longitudinally of the entire crematory on opposite sides thereof. The portions of the conveyor boxes extending along opposite lower sides of the auxiliary heater casings are preferably provided with screen bottoms (61), below whch are found short deflecting chutes (62), extending through the side walls of the auxiliary heater casing below the plane of the openings (59), so as to discharge the material screened through the bottom back into the bottom of the heater casing.

At one end of the heater casing opposite longitudinal conveyor, boxes are provided with short upwardly inclined portions (63), which prevent the elevation of liquid matter into the horizontal portions of the boxes extending along opposite sides of the furnace casing, and arranged to travel within the boxes the entire length thereof are endless conveyor aprons (64), the upper portions of which are supported for travel on rollers (65), while the lower portions travel on the bottom of the boxes and drag the garbage along therein to the feeding hoppers (66), connected with the bottoms of the boxes and extend latterally into the side walls of the furnace casing over the grate fires therein, so as to deliver dry garbage to such grates as fuel. Each conveyor box extends beyond one end of the furnace casing and opens at such ends into the lower end of an upwardly extending elevator spout (69). The elevator spouts for the conveyor boxes are convergently arranged at one end of the furnace casing and communicated at their upper end with the interior of a distributing box (70), arranged longitudinally above the furnace casing. The elevator spouts are provided with endless elevating belts or aprons (71), which serve to elevate the garbage delivered into the lower ends of the spouts into one end of the distributing box. There is an endless distributing apron or belt (73), in the distributing box, which drags the garbage along at the bottom of the box, which is provided at intervals with bottom discharge openings (74), having short chute connections (75) with top feed-openings (76), formed in the top of the casing at the central point of each cremating chamber.

The garbage which is dried in the auxiliary heater is employed for fuel and distributed to the different cremating chambers in the manner described, but certain garbage which is delivered to the crematory may be in such a condition as to be immediately available for use as fuel, and to provide for utilizing garbage in this condition incline feed chutes (77) are arranged in pairs respectively, at opposite sides of the furnace casing below the roadways or dump-floors.

The generation of steam power, the burning of the garbage without the use of other fuel, and the automatic separation of clinkers and ashes are some of the notable features of the Decarie system, and they are very important considerations. The steam power made by the operation of such an incinerator could be utilized by many municipalities for running water or electric light plants, and a great saving could be effected thereby. The ingenious arrangement for conveying the garbage from the drying chambers to the cremating chambers is a labor saving feature of much importance. Another point favorable to the Decarie furnace is the absence of the down-draft, thus obviating the frequent burning out of grate-bars, which seems to be quite an item of expense in the operation of other garbage crematories.

Among the accompanying illustrations is a sectional view of the portable incinerator, in which all of the essential features of the larger Decarie plant are embodied. A twenty-ton portable plant has been built and operated in Montreal. It has cremated from twenty-five to thirty tons of mixed garbage, including kitchen offal, ashes, dead animals, etc., per twenty-four hours, without smoke or odor, producing from two to three horse-power per ton of garbage. Mr. Henry W. Atwater, one of the leading citizens of Montreal, is the manager of the Decarie patents.

TESTIMONIALS.

Montreal.

To T. Lefebvre, Esq., *Chairman Board of Health, City of Montreal:*

Sir—I very well remember having seen at the Gregory Farm, when chairman of the board of health, the Decarie Model Incinerator in practical operation; connected to it was a dynamo giving four electric lights. No other fuel was used but the garbage collected in the city, no coal or other fuel being required.

Yours,etc.,

(Signed) ALEX. GERMAIN, M. D.

MONTREAL.

This is to certify that the Decarie Model of Incinerator was used by this department for a period of two years, to destroy the most offensive part of the city garbage; and it was found to do its work in a satisfactory manner.

L. LABERGE,
Medical Health Officer.

Exhibit E.

The Economical Combustion of Fuel and the Prevention of Smoke and Garbage Furnace.

By Robert Loudon Walker.

I have here several drawings, from which I will endeavor to explain what I consider to be practical methods of burning bituminous coal.

Before I begin, I would like to make an assertion, the truth of which I have demonstrated time and again : "Coal can be burned without smoke!"

When I say this I mean practically "without smoke," because it would be impossible to absolutely stop all the smoke all the time, and there is a point in the prevention of smoke beyond which economy ceases.

However, my methods have resulted in stopping ninety to ninety-seven (90 to 97%) per cent. of it, and when you consider that this means a practically smokeless chimney for about 57 minutes per hour, you can readily see the gain in cleanliness. Whether this gain is accompanied by a corresponding increase in economy, I shall show later.

I desire to say here that the method of which I am speaking is very simple indeed; that the idea is a basic one as applied to perfect combustion of fuels. It is applicable to all forms of furnaces, such as steam generators, heating and puddling furnaces, garbage furnaces, and steam locomotives, with such modifications in the construction as will fit it to local conditions, and particular cases, always preserving, however, this basic feature of the method.

This method of furnace building is simple, scientific, and practical. It is the result of many years of study, experiment and practice. It is one which reason perceives, experiment verifies, and experience confirms.

In the first place, I think everyone will concede that, as a rule, there is something lacking in the present practice of furnace building. This is evidenced by smoke pouring from factory and building chimneys everywhere in this district, an unclean and expensive tribute to errors in the furnace.

It was to locate these errors, and avoid this waste, that I took up the study of perfect combustion with results which speak for themselves.

Experiments have been made which show that, theoretically, it requires about 150 cubic feet of air, at a temperature of 60 to 65 degrees, to consume one pound of average bituminous coal, say a coal containing about 70 to 80 per cent. of carbon or coke.

This assumption, however, is entirely misleading, as you will notice the temperature of air is allowed at 60 to 65 degrees. This is not practicable, and does not take into account the enormous expansion of volume due to higher temperatures. This expansion is shown approximately as follows:

Air required at 60 to 65 degrees, about	150 cubic feet.
Air required at 100 degrees, about....	155 cubic feet.
Air required at 600 degrees, about....	325 cubic feet.
Air required at 1,000 degrees, about...	450 cubic feet.

These approximate figures, however, also neglect the considerable portion of oxygen which passes off uncombined, due to defective fire-box construction, or flues. This loss varies largely, but as a rule, it means that even a larger volume of air than that given above, should be figured upon.

This, then, is one of the prolific sources of trouble, mostly found in boiler furnaces, where the temperature of the air beneath grate-bars, or of the combustion chamber itself, is not so high as in heating, puddling and other furnaces. The present methods of furnace building do not figure on a sufficient supply of air at the proper place. Witness the effect of a blast upon the fires for a confirmation of this assertion.

Another source of trouble and loss is the immense amount of heat absorbed by the air, in raising it to the temperature of the burning gases.

The problem resolved itself into two features:

First. How to supply a larger portion of air, without resorting to forced draught, as ordinarily introduced, and other methods now in use.

Second. How to raise the temperature of this larger amount of air, without too great a loss of heat in the combustion chamber.

With these points in view, I went to work, and evolved a plan of taking the air through holes in the ash-pit, or elsewhere nearby, and carrying it, by means of ducts, to a point above the fire, and then by means of a deflector-arch, introducing the now heated air into the process of combustion, as shown in the drawings.

There was another very important point to be considered, and that was the point at which to introduce this air. This was arrived at by a study of the process of combustion, in its effect upon the fuel itself. The process of combustion, or of converting fuel into heat, is two-fold.

First. The distillation of the volatile matters, the hydrocarbons, which are the flame and smoke-making portions of the coal. This portion of the process must be completed, or nearly so, before the next operation begins, which is,

Second. The consumption of the carbonaceous portion, or as commonly known, the coke.

In the manufacture of coal gas, and coke, the processes of combustion are stopped at the end of the first operation. In some methods of making water gas, the process is carried out to a finish, as in the steam generator, in heating iron and steel, or other metals.

These are well known facts, you will say, but I contend that not enough attention has been paid to this very point. It has, apparently, been so simple that it has escaped the notice it deserves.

For instance, taking one pound of average bituminous coal, we find that about 150 cubic feet of atmospheric air, at 60 to 65 degrees, is chemically required for its combustion. This volume, as I have stated, becomes very greatly augmented by its rise in temperature, but as the proportions will hold throughout a considerable range, I will use these figures for illustration.

Of 150 cubic feet of air introduced into the fire box, there is required:

For combination with the volatile matters, about 45 cubic feet.

For combination with the carbonaceous portion, about 105 cubic feet.

This proportion is further illustrated by the following diagram:

It would therefore seem plausible that during the process of combustion, we should introduce, through the usual channels, sufficient air to distill out the volatile matters, and turn our fuel into coke.

This process has consumed about 25 to 30 per cent. of our fuel, requiring about 30 per cent. of the total air.

We have now remaining about 70 to 75 per cent., by weight, of our fuel, requiring twice the amount of air, by volume, that our first process did.

I therefore came to the conclusion that at this point in the process should be introduced the additional supply of air, at as high a temperature as possible, to economically finish the process.

It was therefore determined to locate the deflector arch at about that point in the fire box where the distilling process ceases, or almost so, and the consumption of the carbon begins!

This gentlemen, is my theory, and the basis of my patents in a nutshell:

I burn the fuel to coke in the front part of the fire box, supplying the required portion of air for this process. The coke is now pushed back to the rear, a larger supply of air given to it, and green fuel put on the front again, the process being carried on *ad infinitum.*

The smoke and gases generated in the distillation are compelled to pass over the incandescent coke fire, and are consumed, adding to the heat of combustion, the cleanliness of the stack, and the economy of the process!

Now, gentlemen, I have been dealing thus far with theory. With your kind permission, I will speak of facts, and demonstrate results as applied to several forms of furnaces, for different purposes.

STEAM GENERATORS AND BOILERS.

Gain in Temperature.—By pyrometer tests, I have taken the temperature of the inflowing air at the point where it is deflected into the fire box. The instrument showed over 650 degrees F. This, gentlemen, with a temperature in the firing room of 100 degrees, was a clear gain of 550 degrees, or over, constantly! You can readily see what this would amount to in heat units, in a day or year.

Smoke Prevention.—You will also please observe, that by introducing air at this high temperature, at a point just in the rear of where the largest amount of smoke is generated, it will not require much additional heat to turn the gases into a clear white flame, almost smokeless. This very thing I have done, and am now doing in a number of places.

Many tests for smoke prevention have been made by perfectly competent engineers of this city, some of them members of this society, and the results have never been lower than 90 per cent., and as high as 97 per cent. I have copies of such tests in my possession, kindly furnished by the people in whose interest tests were made. I am perfectly willing to show the tests or the stacks themselves.

Some of these tests resulted as follows:

Test at "B" boilers	92%
Test at "C. S." boilers	94%
Test at "H" boilers	97%
Test at "Mill C" boilers	95%
Test at "Mill J" boilers	96%

If for no other reason than this, owners of boilers and furnaces should be willing to correct the faults in their furnaces. The gain in cleanliness, the many thousands spent in repainting and cleaning properties defiled by black smoke and soot, would more than counterbalance the cost, to say nothing of the increased economy of operation.

Economy.—I have just received from Chicago, where I have installed a number of furnaces, a statement that shows a saving of 24.4 per cent. per year, on a trial extending over two years. This statement, now in my possession, is an official one, as made to the board of directors, and there is no doubt of the results.

In addition to the saving in fuel, the stacks were clean ninety-six per cent. of the time. This same percentage, obtained on all the smoky stacks of this city, would reduce the smoke question to a point where it would no longer be called " a nuisance."

Some other tests, most of them local, and easily verified, ran as follows:

(Water evaporated per pound combustible from and at 212 degrees.)	SETTING.	
	Common.	Walker.
At Mill C-1, two 2-flue boilers, 4 weeks	7.55	9.48
At Mill C-2, two flue boilers	(No test)	9.91
At Mill O, two flue boilers	do	9.57
At Mill C-U, two flue boilers	do	9.01
At Mill C-S, two flue boilers	do	10.02
At Mill J, six flue boilers	9.12	10.89

These tests are all made on common flue boilers; on tubular boilers the results are much greater, as copies of tests show.

On common two-flue types my practice has been to guarantee 20 per cent. saving, expressed either in additional power, or the same power with less consumption of fuel per horse-power. At Mill "J" tests were made for "economy" and "capacity," with the following results:

MILL J.	Common.	WALKER.	
		Capacity.	Economy.
Evaporation per pound combustible from and at 212 degrees	9.12	9.72	10.89
Pounds coal per H. P. per hour	4.03	3.04	2.46
Per cent. over rated capacity	....	163 per cent.	....

Repairs.—I have been surprised to find that with this setting the life of brick-work seems to be prolonged somewhat. I can only attribute this to the fact that the air in the ducts is constantly absorbing heat from the fire-brick and keeping their temperature below what it is ordinarily.

Mr. Gow.—I think, Mr. Chairman, that the prevalent impression as to the amount of carbon which passes off as black smoke is erroneous. The unconsumed carbon passing out of the smokiest chimney in the city of Pittsburg does not amount to two per cent. of the coal fired. In fact, when a chimney is smoking to the extent of one per cent. of carbon in the coal, it is an exceedingly smoky chimney, and one-half of one per cent. is very bad. Of course, I mean by smoke, in this connection, the black particles of unconsumed carbon, and not the unconsumed CO and the products of combustion. The bituminous coal of this region requires about 150 cubic feet of air to the pound, theoretically, to be consumed. In practice this amount would prove insufficient, the furnace would smoke badly and the waste of fuel would be considerable. Two hundred and fifty feet to the pound is nearer to existing practice than 150. In a recent efficiency trial made by very competent men, where the results attained were the best I know of, 180 to 200 cubic feet were supplied per pound of coal.

Because a chimney is smoking it does not follow that the boiler efficiency is not good. In fact, I am inclined to think that the highest efficiency would be attained when the chimney is not entirely free from smoke. The reason is simple enough—that the amount of heat saved by the combustion of that one-half of one per cent. of smoke black would be more than lost by the heat carried away in the increased volume of products of combustion due to the large excess of air required to get the result.

I know that this would be popularly considered great heresy, but it still is good engineering.

Mr. Walker.—Of course, Mr. Gow is referring now to *common* settings, within his own experience, and I dare say he is right about the inadvisability of trying to run a smokeless stack with such settings, which I am here endeavoring to prove are not designed to do so. But results have proven that my furnaces will prevent this waste without any loss in economy. In many instances, and in every case, I have given from 20 per cent. to 30 per cent. of saving.

I applied my method to two boilers and saved 85 bushels of coal in twelve hours. The smoke test was made by one of the engineers from city hall, and showed 92 per cent. efficiency. In another instance, on a battery of boilers, the saving was one gondola car of coal per day.

Mr. Camp.—In what way does this air come in?

Mr. Walker.—It comes in through holes in side walls, then through ducts to a point near to the deflector arch, which it strikes and is diffused into the fire.

We have Mr. Brennan with us this evening. He has had all the smoke consumers tried. I think it would be advisable if he would tell us whether there is any saving of coal when smoke is stopped.

Mr. Brennan.—I prefer to listen to the information this evening, as I am a stranger. However, the furnaces are doing very well.

PUDDLING AND HEATING FURNACES.

Mr. Walker.—On both of these types I find my work somewhat handicapped by a woeful lack of method in construction. There does not seem to be any fixed proportion between grate surface and the work desired from a furnace, or any relation between grate surface and area at bridge wall.

The stacks are frequently out of proportion to the rest of the furnace. Many stacks, built originally for natural gas, are now entirely too small, the mills having returned to the use of coal. I have found that taking a number of the same style of furnaces, in the same mill, there will be a variation of as much as 20 per cent. in the proportions. As I have not had anything to do with any part of the furnace other than the firebox, this lack of uniform proportion makes it harder to show uniform results.

Many firms do not know, even approximately, how much coal is burned to puddle a ton of iron or heat a ton of metal. I understand that it usually required 30 to 33 bushels of coal in this district to puddle a ton of iron. I have repeatedly produced a pound and one-half of puddled iron per pound of coal. This economy I attribute to the burning of the gases in the furnace, instead of in the stacks, as is done in many cases.

	Common.	Walker.
Test at Mill "X," two turns per day. Pounds iron per pounds coal	.89	1.12
Pounds coal per pounds iron	1.11	.89
Test at Mill "M," 3 turns. Pounds iron per pounds coal	1.20	1.52
Second test	.....	1.50
Test at Mill "S"	.....	1.50

Mr. Crooker.—May I ask if you use a top blast?

Mr. Walker.—Yes, sir. On heating furnaces I have shown some very good results, but no test by weight has been made. The only gauge I have is the amount of work done by the same furnaces before and after changing to my construction.

At mill "K" the output of two heating furnaces was increased 100 per cent., and the manager stated the saving in fuel to be over 50 per cent.

At mill "J" the increase in capacity was almost 50 per cent. Two weeks' output before I changed the firebox was 602 gross tons, consuming 108.68 net tons of coal. Two weeks after the change of firebox 709.50 gross tons iron with 102.75 of coal.

At works "C-N" the material was heated more rapidly, but owing to the nature of the work no capacity test could be made.

In all these tests the heat was steady and uniform, and the waste of metal by oxidization was lessened considerably. This is probably due to a lesser amount of uncombined oxygen in the gases.

The percentage of smoke prevention was high in every case, some furnaces running smokeless all the time, even after firing.

GARBAGE FURNACE.

The United States Congress recently passed a law forbidding the dumping of garbage or refuse into any river or harbor. This law, which is recognized as a wise sanitary measure concerning the public health, confines the disposal of garbage to one method, *i. e.*, its destruction by heat.

The principal objection to this method has been the noxious odors arising from the process. This nuisance has been augmented by attempts to recover the oily matters (about 3%) present in all garbage, by boiling or distillation. This necessarily generates odors which are very unpleasant and unhealthy. Sanitation demands a better method of destruction.

Here are drawings of a furnace for cremating garbage, designed particularly with reference to elimination of bad odors. We all know about our local troubles in this respect.

In this furnace we have a horseshoe form, and a water damper built on the same principle as the one in my locomotive engine.

The process is designed to be continuous, first on one side and then on the other, the direction of the draft being changed by the mechanism and the damper.

The fire-boxes are built on the same plan as all other furnaces. The gases are compelled to pass over an incandescent fire on their way to the stack, and are there completely consumed. All gases will burn with proper sufficiency of oxygen.

I believe it will also be possible to so connect this furnace with the local sewers that much of the dangerous and unhealthy sewer gas will be withdrawn and burned.

Another feature of this furnace is that the heat from the gases can be utilized in making steam, which can be converted to electricity.

If a city the size of Pittsburg were equipped with six or seven such furnaces, in convenient parts of the city, not only could garbage be destroyed without odor, sewers ventilated, but electricity be generated for the use of the city.

I figure that every furnace could supply sufficient heat to operate a 500 horse-power boiler. This would yield upwards of 500 arc lights. These street lights now cost the city of Pittsburg $96 per year per light. You can readily figure that this end of the business could be made profitable, and easily overbalance the profit obtained from extraction of the grease, and with less annoyance to the neighborhood. It is needless to say that this furnace, in addition to being odorless, is also smokeless.

Mr. Gow.—Has a plant on this general plan been constructed?

Mr. Walker.—No, sir. But experiments I made have demonstrated that garbage odors passed over an incandescent fire lose their odors.

Mr. Schellenberg.—We should speak a good word for our old member, Mr. Walker, that his furnace, regularly tended, will consume the coal fully and leave only ashes as waste through the grates. I point out, too, that we have corroboration of the assertion that the waste of the carbon from a smoking chimney will be less than one per cent. It is plain that the amount of soot, as the complete collection in the jars shown by Mr. Preston, of five and one-half gallons from the consumption of 13 to 14 bushels of coal—equal to 1,000 pounds—is not over one-half of one per cent.

Mr. Walker.—We all know that the furnaces are not built as they should be. I have been connected in one way or another with this business for 35 years, trying to stop the smoke nuisance. I can teach any man to work the fires on my furnace in three hours.

I have heard it said that good iron cannot be made without smoke. I failed to notice that Pittsburg's prestige suffered much during the time when all the mills used natural gas, as some of them do now.

I think the elimination of the smoke nuisance would amount to a saving of almost a million of dollars a year in cleanliness, health and economy.

A SPARKLESS AND SMOKELESS LOCOMOTIVE.

I consider this achievement one of my best. Some years ago a test locomotive was built by me, and run for many months, without sparks or smoke. I was unable to follow the matter up at that time, for financial reasons.

A test made on the Illinois Central, with Illinois coal, showed an evaporation of 8.25 pounds of water per pound of coal. The test was over a stretch of 540 miles, between Chicago and Champaign. The Illinois Central put against me what they considered their best engine. They showed an evaporation of 4.50 pounds of water, a difference of 3.75 pounds of water per pound of coal in favor of my engine.

This machine ran for many months without a cent for repairs. I have recently patented some important improvements, the result of later experiences. It will now be impossible for the damper, which was the only source of weakness, to get out of order. The damper is now turned by steam, and much simplified.

No Extra Work for Engineer.—The engineer has nothing to do with this device. The fireman turns the damper, by simply turning, one-quarter turn, the handle of the cock on top of the boiler (see drawing Fig. 1). This changes the current from right to left or *vice versa.* As soon as the damper is turned and in place a new charge of coal is put on.

Saving in Fuel.—I understand 200 miles is considered a day's run for a locomotive in passenger service, and 50 pounds of coal the average amount of coal burned per mile. A locomotive averages, therefore, a consumption of 10,000 pounds of coal per day.

My locomotive would save at least one-third of this coal. On the 30,000 locomotives of this country this would be enormous.

Steaming Capacity.—The additional heating surface in the furnace, namely the center water-leg and damper, are exposed at all times to an intense heat, with an unfailing supply of water. There is no reason why, with Pittsburg coal, this locomotive should not give nine to nine and a half pounds of evaporation.

Saving Tubes and Flues.—Since no sparks come in contact with the ends of the flues, there is nothing to wear them away, and thus cause them to leak. All sparks are burnt up in the lower part of the fire-box, and there is no need to have an extension front or a netting in the stack, as there are no sparks.

Saving Roadbed.—Where stone ballast is used it is well known that the cinders fill up the spaces between the stones, and holding the moisture, cause the sleepers to rot.

With a new locomotive the cost to apply this method would be about $300 additional. Where this would be done in the shops, necessary tools and knowledge would cut this down.

The absence of sparks would eliminate a fruitful cause of forest fires, which cost thousands of dollars annually.

J—Is a cock connected with steam space of boiler, and each end of cylinder *J* 1 by pipes *J* 1 and 2. When the steam is passing to the right-hand end of the cylinder, the left-hand pipe is exhausting and *vice versa.* The change is made by turning the handle of the cock (*J* 2) one-quarter turn, and this is done by the fireman. It is put behind the steam gauge in practice.

D—Discharge pipe from damper to steam space. This pipe, which carries steam at the same time water, and falling on the crown sheet, will be the means of preventing damage in case of low water in boiler.

J 4—Gland to hold the thrust of spring on damper spindle and is held in place by three 1-inch studs screwed into boiler.

Figure 2.—Cross section through furnace, showing water-leg (*J*), arch (BB), of fire-brick, and damper (*D*).

A—Are brace pipes connected with water space.

The corrugated fire-brick arches break up sparks.

(*S S*)—Grate surface.

There has lately been considerable talk as to what the electric engine was going to do to the steam machine. Let us consider for a moment the cause for alarm.

The electric engine cannot be made heavier than the present steam locomotives, because the capacity of bridges are tested to their full capacity to-day. The traction would be the same, according to their weight. Prepare both equally to meet the atmospheric pressure. and I know no reason why the steam engine cannot run as fast as the electric engine.

Great stress is put upon being able to generate more steam with stationary boilers than with the locomotive boiler, as it is to-day. The average evaporation in stationary boilers is not over eight pounds per pound of coal.

Losses from the boiler to the engine, from engine to dynamo, and dynamo to motors, especially on long lines, would bring down the available power very materially. A locomotive built on the plan I have outlined, giving 8.5 pounds of evaporation, would, I believe, put the electric competition out of the race, considering the interest on investment, etc.

New York City, *February* 13, 1900.

A. H. Doty, *Health Officer, Port New York, Fort Wadsworth, S. I.*

Dear Sir.—I herewith enclose particulars concerning cost of erection and operation of the Walker Garbage Crematory.

To build a furnace capable of cremating 125 tons or more per day of 24 hours would cost at the very highest $10,000.

Space required for the above would be actual size of furnace, 80 feet long by 15 feet wide, driveway around furnace 23 feet. Incline plane to get on driveway on top of furnace, 50 feet, making the ground required 153 feet long by 61 feet wide. This is assuming that garbage is delivered by carts direct into the furnace.

If two furnaces should be required to be built together, the same length of ground would be required, but width would have to be 38 feet additional, making ground required for two furnaces, 153 feet by 99 feet.

If furnace is to be fed by bucket elevator and belt conveyor the driveway can be dispensed with, which would then make the ground required as follows:

Size of furnace, 80 feet by 15 feet.

Pit for holding garbage in front 10 feet wide, 15 feet long and 6 feet deep.

Space to work fires, 10 feet all around.

Driveway in front, 23 feet.

Making total space required, 123 feet long by 35 feet wide.

Cost of cremating 125 tons per day of 24 hours, assuming the garbage has the minimum percentage of carbon, say 10 per cent.

125 tons of garbage would contain 12½ tons carbon, equal to 12½ tons coal.

In addition to this we would have to use six tons of soft coal slack, costing about $2 per ton or less, $12.

Should the garbage contain a higher percentage of carbon—such as house garbage mixed with house ashes—the amount of coal required would be less.

Labor to operate one shift of eight hours, four men at $1.50 per day, foreman, $2.50, equals $8.50 per shift, or $25 for three shifts

Cost coal cremating 125 tons	$12 00
Cost labor cremating, 125 tons......................	25 50
	$37 50

or 30 cents per ton.

The cremating of 125 tons garbage per day would produce from 500 to 700 horse-power of steam, which would make one arc light for every horse-power, which at $96, light per annum, say 600 horse-power, or $57,600. Besides this the ash or clinkers could be utilized for various purposes and the melted metal would be a considerable item.

RECAPITULATION.

Ground for single furnace of 125 ton capacity—153 feet long by 61 feet wide.

Ground for double furnace, 153 feet long by 99 feet wide.

Single furnace with conveyor, 123 feet long by 35 feet wide.

Cost of erection single furnace about, $10,000.

Cost of running 24 hours:

Coal, about	$12 00
Labor	25 00
Total	$37 50

Cost per ton, 30 cents.

600 arc light, at $96 per annum	$57,600
Ash and clinker	
Fused metal	

This furnace will cremate without smoke or odor—sewers can be tapped and the gases can be destroyed in furnace. Furnace can be built at different points in city, thereby expediting delivery of garbage and reducing cost of hauling.

As large quantities of hot water are made, each cart as it delivers its load can be completely flushed and thoroughly cleaned before going through the street again.

In making these estimates, I have endeavored to give the outside figures of cost of building, and have figured the garbage as being in the worst possible form.

Hoping I have covered all points necessary, I am,

Respectfully,

ROBERT L. WALKER.

Exhibit F.

The Municipal Crematory for Garbage at Bullerdeich, in Hamburg.

By F. Andreas Meyer, Chief Engineer of the Building Deputation of Hamburg.

INTRODUCTION.

The ordinance for the cleaning of streets and carting of sweepings and garbage introduced in Hamburg January 1, 1886, placed this part of the public administration in the hands of the engineers of the building department. The actual cleaning was done by this department, but the furnishing of the horses for sprinkling carts and sweepers, as well as the carting of sweepings, garbage and rubbish was for a term of five years awarded to several large contractors.

In the early period of these contracts difficulties were encountered in the disposal of the garbage, in the country, and it became apparent that by means of the greater distances it would have to be carted through spread of the city limits, and the increasing requirements of the health department as regards transportation and disposal, that the contractors would demand an increased price for future service.

After the technical attache of the German Embassy in London had in 1886 called attention to the system of cremating garbage and rubbish in use in England, an article written by the architect, Mr. Knauff, was published regarding the same subject, which induced the city government of Hamburg in the summer of 1889 to send its inspector of street cleaning, Engineer Richter, to England for the purpose of studying this system of garbage cremation. Richter made a report of the favorable impressions received from this journey to the Hamburg Architects' Engineers' Association, November 27, 1889.

In the meantime the city architect, Hauser, of Aix la Chapelle, in an Essay before the fourteenth meeting of the German Society for Public Hygiene, September 15, 1888, at Frankfurt, A. M., called further attention to the English garbage crematories, and in the year 1890 published a minute description of those institutions.

For the purpose of being informed in time regards the increased demanded by the contractors for the further cartage of rubbish, and so as to be prepared, should the estimates prove unfavorable, to in time erect a crematory before end of the term of the first contract, the Hamburg Building Department called for bids in September, 1889, for a term of five years, beginning with the year 1891.

The result of these bids was extremely unfavorable. The contractors had divided the city into districts amongst themselves, and had increased their demands from 216,000 marks to 423,000 marks per annum. Notwithstanding, however, that it could be proven that the city could do just as well by the introduction of a system of garbage cremation and that through such the increase of these noxious deposits around the city would be done away with, and the increasing demands of the contractors be avoided, the city government of Hamburg feared to adopt a system which had not as yet been tried upon the continent, and preferred to let out the cartage for another five years as before.

After the entry of Hamburg into the customs union in 1888 the large warehouses within its limits were taxed to their utmost capacities, and the question of the erection of a crematory received a new impetus, through the difficulties experienced in disposing of the waste, such as tobacco strips, coffee shells and the many goods spoiled. The attempts to burn such wastes in the fires of large factories failed by reason of their construction, being unfit for such purpose. The destruction of this waste in the country met with official difficulties. A plan was adopted to build a furnace specially for the cremation of such waste, and the idea was revived to use this furnace as an experiment for the cremation of the city's sweepings.

Before any definite resolve had been reached in this matter the system of cremation received a decided advancement through the cholera epidemic of 1892. As already reported by Dr. Reinche and the writer in the annual meeting of the German Society for Hygiene, in Magdeburg, 1894, the unloading of garbage in the county districts from Hamburg was stopped by the authorities thereof for fear of contagion. The garbage therefore had to be buried or heaped up in piles in public places, and such as caused most suspicion of contagion had to be burned in open field, as well as possible, very often in the immediate vicinity of thickly inhabited places. This serious experience induced the engineers to again take up the former idea, and they proposed the erection of a crematory containing 36 furnaces, at a cost of 480,000 marks, for the purpose of cremating the waste and rubbish of the harbor districts as well as the sweepings and garbage of the city district, containing more than 300,000 inhabitants, and which in case of an epidemic could be used for the destruction of all suspicious material.

This proposition of the building department, approved by the senate, met with the opposition of a part of the citizens for various reasons. Some doubted the combustibility of the rubbish, while others considered the destruction of a more or less needed manure as an error. A report of the street cleaning inspector of Berlin, in which the English process was judged unfavorably, and the assertion made that the system in England was being discarded again, and was particularly not adopted to German circumstances, especially for Berlin, was circulated extensively by permission of its authors among the citizens of Hamburg, and proved a good medium of agitation against the project proposed by the senate. For the purpose of a clearer understanding of the matter, the writer, in company with Dr. Reinchke and Building Inspector Richter, again visited England from June 14 to 27, 1893, and was enabled in a meeting of the citizens to personally testify that the statements of the aforementioned report concerning the crematories in England were erroneous, and that on the contrary the system of cremation had been considerably extended in the various cities of Great Britain, and had received the earnest support of the English Government for their advancement.

The citizens of Hamburg therefore voted for the erection of the crematory on July 12, 1893, expressing the wish, however, that the carting to said institution, which the senate had resolved should be done by the city authorities, should in future be given out in contract, to avoid the ownership of the large number of horses needed by the city.

It is interesting to note the difference attending the course of this matter in Hamburg and Berlin. While the system of cremation in Hamburg was proposed by the building department and approved by the senate and city government, it met with opposition on the part of the citizens, while in Berlin it was advocated (no doubt principally through Dr. Weyhl and Architect Garbe) by the city representatives, and the government only reluctantly granted the sum of 100,000 marks for the purpose of experiments.

It was decided between the directors of the Berlin experiments that City Architect Bohm and Government Architect Grohn, who in the meantime had also studied the crematories in England, and the writer, should proceed in the construction of the furnaces in Berlin and Hamburg together as much as possible.

Numerous offers were received not alone from English firms, which had been constructing such furnaces, such as Manlove, Alliot's Co., of Nottingham; Massay, Goddard & Warner of Nottingham; Refuse Furnace Co. (Lim.) of Leeds, but also from German furnace builders, such as Schneider, Kori & Lonholdt, who desired to take up this matter and recommended furnaces of their own construction. We agreed, however, that it was desirable to make experiments regarding the practical construction of such furnaces, but that these trials must be made upon the basis of such already tested constructions in England.

Those of English construction that were principally considered were the furnaces of Horsfall, of Warner, and one with a continuous feed of the garbage, made by Whiley in Manchester, and it was agreed that in Hamburg four Horsfall furnaces and two with automatic feed similar to the Whirley furnace, and in Berlin two Horsfall and three Warner furnaces be constructed, so that a comparison could be made between the services of the Horsfall furnaces in the two cities.

The transactions with the manufacturers of the Horsfall furnaces, the Horsfall Refuse Company (Lim.) of Leeds, not contrary to expectations with some difficulties, as that firm at this time seemed to be in its experimental stages. Various different furnaces were offered under the name of the Horsfall system, and therefore the Horsfall furnaces in Berlin are quite different from the Horsfall furnaces in Hamburg.

At the beginning of the transaction a plan had been prepared for the entire establishment, by which the feed of the refuse should be effected by means of the two-horse wagons in use in Hamburg for carting the same, capable of carrying about 4 cb. m. These wagons were to be lifted and emptied by means of an electric crane. The representative of the Horsfall Co. however recommended a method used in England and which has no doubt proved very practical there, that is to have the refuse carted by one-horse carts, holding from 1 to 1½ cb. m. and driving them up an incline to the platform of the furnace, where they are to be dumped. As such one-horse carts are not used in Hamburg, the adoption of this method would have met with a great deal of opposition on the part of the contractors there, and the cost of transporting, by reason of the need of more men through smaller carrying capacity of each vehicle, would have been increased. Finally the doubt seemed justified that through the large number of wagons that would have to be used in a crematory of such large dimensions (even up to to-day there is no larger) 100 @ 4 cb. m. in eight hours, there would not be sufficient space in which they could operate. These considerations resulted in the resolve to adopt the original plan of lifting and emptying the wagons by means of an electrical crane.

Furthermore, it had been projected to place the furnaces back to back, in accordance with most of such English establishments, with one principal flue or channel for both at the bottom and the feeding of each individual furnace from the top. Against this the Horsfall Co. recommended a single row capable of feeding from the rear, and the flue on top, which has been done in the furnaces at Berlin.

After considerable consultation a form of furnace for trial was agreed upon which came near to the original plan. The Horsfall Co. agreed, April, 1894, to erect four furnaces at the total cost of 34,859 marks, within twenty weeks, and put same ready for use upon a foundation within the building, to possess a capacity of 5,000 kg. per furnace in twenty-four hours, the company to guarantee the same and furnish practical, experienced employes of its own for the running of same.

The other two trial furnaces were also patterned after English models, but were provided with automatic furnace bars for the purpose of effecting a continuous feed of the refuse to be cremated, as well as a saving for help. It is unnecessary to enter upon these furnaces any further, as a trial has proven the automatic feed to be impractical, the slag remaining generally forming itself into a compact mass, which it is difficult to do away with, and by final explusion from the furnace carry with them the larger part of the fire, so that a refanning of the same is often difficult. It was also proven that there was no saving in running expenses effected through such automatic feed, and it was taken off, and the two furnaces to-day are similar to the others.

In March, 1894, the erection of the entire crematory was commenced in accordance with the plan of the writer, prepared by Building Inspector Richter, and progressed so favorably that middle of December, 1894, the heating of the trial furnaces in the provisional building could be commenced. After the furnaces had been worked for about four weeks with natural draft, so as to give the new masonry work an opportunity to dry and harden, by which about 2,400 kg. of refuse had been cremated in each furnace every twenty-four hours, the steam blowers were used, effecting an increase of 4,500-5,000 kg. The steam used for these blowers, however enormous, viz., 75 kg. per hour each furnace, so that the hot gases of the furnaces were insufficient to generate this amount of steam, and a coal fire in the front boilers had to be used therefor. A trial with dry air blowers gave seemingly better results, notwithstanding the engineer of the Horsfall Company preferred the steam blower, inasmuch as he claimed that such mechanical devices had not proven satisfactory in English establishments. This caused me a great deal of worry. The trial with six furnaces could not be taken as a standard for thirty-six furnaces, because the principal or main flue and chimney built for the entire plant naturally possessed too large a dimension, and, therefore, too great a cooling space for six furnaces. To this fact the Horsfall Company also attributed the possible failure to reach the standard expected of these furnaces with the heat generated by the gases thereof.

During these trials the noise occasioned by the steam blowers at the front of the furnace proved unbearable. Upon the recommendation of Engineer Roechling, for this reason, the large main flue or channel between the furnaces directly under the front grate was dispensed with, and in this space, connected with the air outside, the blowers were placed, thereby decreasing the noise considerably. This change was possible, inasmuch as the main flue, projected in the original plan, had been retained, so that the smoke-box might be led into said channel or flue by means of perpendicular slots.

After a six months' trial, in 1895, it seemed that a clear understanding of the practical details of these furnaces had been obtained, and agreement was made with the Horsfall Company for the construction of the other thirty furnaces. Thanks to Building Inspector Richter, the eventual introduction of dry-air blowers was provided for, notwithstanding the use of the steam blowers in the foundation under the furnaces. The firm on July 26, 1895, agreed to construct the thirty furnaces, within five months, at a total cost of 93,000 marks, place the same upon the foundation, inclusive of main flue or channel and steam blowers, and to test the same three times within the first six months after they had been placed in service, each test to be of a duration of fourteen days, guaranteeing to show a capacity of 5,000 kg. per furnace each twenty-four hours in use, and not requiring a special coal fire for the steam blowers. At the close of 1895 the furnaces were finished, allowing a gradual heating for the purpose of drying.

At the same time the second five years' term of the contractors for the removal of refuse had expired, which enabled the receiving of bids for new contracts for the following five years under the following conditions:

The contractor engages to cart the refuse from the houses in the territory shown in plate 1, comprising the middle part of the city, St. George and St. Paul, with a population (1896) of 301,000, to the crematory, for which the sum of 315 marks per year for 1,000 inhabitants will be paid. The refuse from the other parts of the city may, as heretofore, be carted to the country for use as manure, for which the contractor will receive 312.50 resp., 316 marks per year for 1,000 inhabitants. In case of stoppage of the workings of the crematory, the contractor agrees to cart the refuse destined for the crematory, upon payment of the additional sum of 0.85 marks per 1,000 kg., to the country.

At the beginning of the operation of the crematory the refuse of the harbor districts, as well as that collected in the harbor and on the piers and docks of the same, were sent there for cremation, such being sent by boat.

In the sixteen months of continuous service the crematory has satisfied all requirements, and has proved very successful.

PREAMBLE.

The decision of the city of Hamburg to erect a crematory for the destruction of the city's waste and rubbish in a magnitude not even found in England, which is the only country up to this time that destroys its wastes by the method of cremation, is due to practical consideration and perfect technical preliminary examination, not in a desire for novelty, but in the necessity of a large city of more than 600,000 inhabitants, is the motive therefore to be found and the success achieved in the now more than one year's practical work of this institution, justifies the confidence placed by the government of the city of Hamburg in the technical knowledge of its neighbors on the other side of the channel, as well as the carefulness of its own building department, when it decided, in the year 1893, without any preliminary trial, to erect such a crematory for the destruction of the waste and garbage of the middle section of that city containing more than 300,000 inhabitants.

At a meeting of the German Society for Public Hygiene held in the city of Magdeburg, in 1894, the two members of this society from Hamburg, Dr. Reincke and the undersigned, explained the fundamental principles of the undertaking and the general interest awakened in the first venture on the continent, not mentioning trial in Brussels (on a small scale) sufficiently proved that this question had become one of great importance, not alone in Hamburg, but in all other places.

As early as 1890, when only six furnaces were in use, but particularly after all of the thirty-six furnaces were in active service in January, 1896, requests for information regards construction and result, both from home and abroad, were received by the Hamburg building department in great numbers. A number of German cities sent wagon loads of garbage for experimental cremation to Hamburg. Many of those attending the Kiel meeting of the aforesaid society accepted the invitation of the writer to view the working of the crematory.

Although the best possible information was given to all inquiries, a definite result of the service was not to be had, and the writer was compelled to repeatedly request the waiting for the lapse of a full year's service, inasmuch as by reasons of the uncertainty of the service the first few months could not be taken as a standard, and, therefore, the year from April 1, 1896, to April 1, 1897, could only be used to obtain a standard result.

The report thereof is now given, and the writer, through its publication, hopes to discharge the many obligations he has entered, but begs the reader to consider that a perfection of the service has not as yet been reached, but that even better results may be achieved in the future. Numerous improvements have been made after April the 1st of this year, particularly several measures to do away with the dust so disagreeable to those employed in the crematory.

DESCRIPTION OF THE INSTITUTION.

The sight chosen for the crematory is shown in plate 1, in its relative position in the city and in plate 2 is shown in larger dimensions. Lying on the southeast boundary of the territory destined to supply it is easily accessible both by land and water. It does not adjoin any private property. The front or northern part is situated on the street called "Bullerdeick" and is opposite a large disinfecting establishment; the rear part is on a tributary of the river Elbe, called "Belle," which is navigable. The west side is bounded by a public bathing place and along the entire east side, a railroad viaduct has been suggested. The sight being so favorably located for this purpose no attention could be paid by the purchase of same to the poorness of the ground consisting greatly of bog formed by the embankment of the Dammerbroker-Elbmarsch necessitating a deep foundation and filling in.

The disposition of the establishment is shown in plates 2 and 3. At the street is the administration building (see plate 2) containing in the basement thereof waiting, wash and bath rooms for the employes. The ground floor holds the offices and in both this and the upper floor the dwelling rooms of the manager will be found. This building in conjunction with the garden, which stretches along the entire front of the property and divided from the street by means of a high railing, give to the institution a very pleasant appearance. Adjoining the paved gateway is a scale of 10,000 kg. capacity and a guard house for controlling the quantity of refuse coming in and the slag going out. In the center of the place the furnace house is situated with the machinery and boiler house in front of same longitudinal the chimney and along the left boundary is the slag breaker and sieves.

The refuse brought by way of the land is carted in specially constructed water tight iron wagons (see plate 4) the body of which will hold 4 cb. m. and can be lifted from the running gear and is provided on top with two double covers for the purpose of loading and at the rear with a chute for the purpose of unloading. At the sides are two large hooks to which the chains of the crane or derrick are fastened.

The crematory proper which is shown on pages 5 and 6 consists of two complete separate and perfectly symetrical systems each of which can be operated independent of the other. This separation has not alone been effected in the furnaces, but also in the main flues or channels and the boilers; besides the diagonal flue has been provided to enable the flues of all furnaces to be lead either through the right or left boiler as desired.

The 36 furnaces are located in two longitudinal main tracts in the large furnace room. To avoid greater changes of formation, through differences of temperature as well as to be easy of access they have been placed in groups of six.

Above each tract is suspended an electrical movable crane for the purpose of lifting off the bodies of the wagons standing upon the paved ways at the heads of the furnaces, which will carry same to the feed in the respective furnaces. By means of an electric windlass the box of the wagon is raised to an inclined position and the contents emptied upon the platform of the furnace through the chutes, after which the empty box is again replaced upon the running gear.

The feeding of the furnaces accomplished at intervals of about one and a half hours takes place from the platform in which there is one opening for every two furnaces, placed back to back.

One working man called the stuffer supplies six furnaces as a general rule and puts the refuse lying upon the platform by means of a shovel and crowbar through the feed opening into the front of the dry grate of the furnace. The further serving of the furnace is then done by the furnace man whose position is in the aisles under the platform in front of the furnace. There are four such aisles in accordance with the grouping of the furnaces, two of which, the middle ones, meet each other. Each furnace man serves three furnaces by spreading the refuse lying upon the front grate by means of crushers upon a movable grate over the fire in their layers. Every one and one-half hours the slag has formed itself into such a thick mass that it hinders the draft through the grate and dampens the fire. In these intervals the slag and ashes must be removed by the furnace man with crowbars and hook, placed upon the dumping wagon and removed to a place behind the furnace room. During the breaking of the slag and the getting of new refuse, the blowers are set at rest. After the breaking off of the slag and when found necessary the grates must be raked so that the fine ashes may fall into the ash cart below the grate, which box must be emptied every twelve hours. The feeding of the furnace takes place after the cleaning away of the slag, or on special requirements and the stuffer is notified thereof by an electric signal from the furnace man.

The gases from the fire as well as those coming from the refuse escape through holes in the ceiling over the fires into a secondary compartment, the walls of which are always hot and which will ignite these combustible gases. From here the smoke gases will go through the smoke channel between the furnaces and the perpendicular slot, which lead into main smoke channels into all furnaces. The ashes flying out of the furnaces gather in the aforenamed compartment above the ceiling and must be removed therefrom twice a week and once every three months out of the main channel. To support the effect of the draft of the chimney the necessary quantity of the air is brought to the furnaces by the blastings in the closed ash pits. In the beginning, the steam-ray-blastings were working as demanded by the rules of Horsfall & Co., i. e., in the manner of the blasting pipes of a locomotive, two on one furnace, the steam ray escaping through a little ventilator takes the air along in a funnel-like pipe, pressing the same in the ash pit. There the combination of air and steam is passing through the cast iron blast chambers which are situated on each side of the fire grate before entering the ash pit. This blast chamber is patented by engineer G. Watson of Leeds, and is serving a double purpose; first, it heats the air combination passing through it, and vice versa; the said combination is cooling the fire-exposed wall of the chamber, but it has its disadvantage—when the exposed casting becomes damaged or burned through, the heated air begins to escape and interferes with the fire. An asbestos protected wall or casting would have its preference, as such protection of fire-proof lining would hinder the direct escape of the gas, even when the cast iron part of the chamber has been damaged by fire. It would seem necessary, however, that the above should be given further trial.

The main advantage of the beforesaid combination of steam-air in reference to dry air, the Horsfall Company claim, that the steam combined with air conducted through heating chamber, the steam will decompose in its original gases, oxygen and hydrogen, and thereby when entering the fire combined with the generated carbonic gases and so becoming of quite a support to the fuel, and as this fire proves of such efficiency that the cremation portions of the furnace showing red had the above described effect remains indisputable, but as sure as the above said revenue of the furnace fails, then the steam air blast becomes rather detrimental to the fire and in such case falling down to the temperature of 60C. Therefore the steam in form of dew, easy to liquify, dropping down on the garbage, becomes only consumer in place of supporter of heat and fire, and such retarding moisture then reduces the energy of the retort, since 75 kg. of weight per hour and the liquified steam becomes in such case a cold bath to the garbage, the water sometimes running through the cinders opening to a general disadvantage of fire under progress of cremation.

This may be largely charged to the peculiar quality of garbage of Germany and England as the one may contain more combustible material than the other and therefore the day blast, or dry air blast furnace lately erected in Hamburg, will produce more favorable results by furnishing more equal and regular fire to the furnace and thereby the cremating energy lessens the requisition of blast, the saving of power of about one-fifth in comparison with the above described aired steam blast.

It appears from the general view and from the results obtained by the many trials that the beforedescribed combination as blast-compound is considered as unfavorable and therefore the present construction of furnaces so arranged so as the changing of steam moistened blast into a dry air blast the furnace is convertible into such without any remodeling or further change. The new blast apparatus consists of two centrifugal blowers each connected directly to the shaft of an electric motor, each blower supplies eighteen retorts and requires about sixteen horse-power. The collection of the air for the supply of the blowers takes its place in the working alley by the suction of dust and other unfavorable gases produced in the portion of furnace containing the cinders and thereby this compartment freed of all smoke making some accessible. The air ducts conveying the partly pressed blast air being situated on each side of the smoke duct becomes partly heated and thereby the blast may be considered a moderate hot blast.

There is also besides the appropriate sliding dampers, each blast duct and each retort, an extra connection duct in order to connect more retorts when deemed proper to one of the blowers, or also to connect same in support of the other blower when same may be required.

The air entering the lower air ducts or channels serving as smoke ducts in the former process and from here entering the before-mentioned cast iron blast chamber, performing its function upon the fire in same manner as in the former one.

The expansion of the air on blast became of such pressure that the tunnel formed ends of the blow ducts cross area became too small and hence an additional opening leading directly into the ash pit inserted. All the three mentioned openings are in full control of the tender.

Here from it can be observed that in constructing a new crematory furnace there may be many useful forms and remodeling of such furnace taken in consideration led by the above manifold trials, and processes with steam and air combination repeated, may effect yet the best results and yet simplify the construction of same.

The ventilation blowers have stood the trial of one year successfully and the satisfaction so complete so as the want of converting the furnace into steam and air blasts were no more required, as the later one been often hindered by manifold blocking of the several parts of the same. The existence of the vacuum formed water column of about 10 mm. in the retorts produced by the draft of the smoke stack, the ventilator or dry air blast producers about 35 mm. water column pressure in the ash pit.

The main smoke duct is leading through and beneath the thoroughfare between the boiler house and furnace room; entering the boiler house it separates in two ducts each provided with sliding damper in order to facilitate the leading of the hot air right under the boilers or direct into the smoke stack.

At present there are two boilers provided, one in each boiler room, leaving a further room for one additional boiler.

There are also emergency fire grates placed in the smoke ducts to each boiler to facilitate the production of steam in the start of the crematory plant before all parts are thoroughly heated in order to enable the running of the several illuminating and other contrivances required in the said plant.

At the junctions of both of the smoke ducts referring to table 7, the smoke stack elevation and section is a partition of fire brick in the interior of the smoke stack separating the two currents of smoke and thereby producing proper and undisturbed drafts.

A steam pressure of 6 atmospheres expansion developed by the boilers drive two steam dynamos in the engine room each of 40 horse-power which produce the power for operating two electric derricks, two ventilators, the cinder breaking apparatus and sifting works as well as illuminating the crematory, 14 arc lights, 8 amperes and 62 incandescent lights. Also a feed magazine for accumulator lamps of the sifting works is employed. For the day work one dynamo engine is sufficient, where during the night both of them have to be kept working.

Although a great amount of superfluous heat exists and it is possible to employ 100 horse-power for other purposes.

The cinders taken from the furnace are brought by dump wagons to the cooling apparatus which is situated outside the furnace wall, and after being cooled off by a good water sprinkling, they are taken to the cinder breaking and sifting apartment and emptied in the cinder breaker. Here the process of grinding and sifting the cinders is performed. Parts not sufficiently broken or pieces of metal are thrown out at the end of the sifting drum and sorted out by hand. The broken cinders serve as good material for street building and the metal can be sold. In conclusion the following may yet be said about the crematory: The cost of building the foundation of the work was 51,000 marks. A result of the unfavorable building ground. For the construction of the Beton underlayer of the last built 30 cells, the cinders taken from the 6 trial furnaces were used.

The furnace wall is built of iron frame work covered with composition metal of tin and zinc. The walls are of ordinary brick like those used for other buildings. The rear of the hall is closed in by a tin wall which can easily be taken away in case of enlarging the crematory. The tracks of the rolling derrick are supported by brackets fastened on the verticals of the frame structure or on the centre pillars of the hall.

The furnace foundation consist of cinder Beton between which iron supporters are laid. The iron construction of the furnace hall, including engine and boiler room at a total weight of 180,000 kg., was finished by H. C. E. Eggers & Co., of Hamburg, the mason work being done by Th. E. Radel of Hamburg.

The furnace cells, which in their now somewhat changed form are represented in table 8, were constructed by Civil Engineer M. Hempel of Berlin.

The chimney 48.6 m. high was erected by mason Paul Eckler with the assistance of the expert builder of chimneys, B. Otto Rosen, both of Hamburg.

The shaft was built of radical bricks, the inside of the chimney being covered with chamotte which through an air space is isolated from the outside hull.

The boilers and the smoke pipe were furnished by the Orange works in Gelsenkirchen. In the course of time the firm of W. V. Essen of Hamburg added a cleaning apparatus to them which made it possible to remove the ashes which accumulated in the smoke pipe while the machinery was in operation. The construction of the machinery and the rolling derricks with the exception of the later erected ventilator as well as the cinder breaking plant was awarded to the Union Electrical Manufactory in Berlin. The rolling derricks have a carrying capacity of 5,000 kg.

The two steam engines are upright double expansion engines, so-called torpedo boat engines, with a fly wheel regulator of 300 revolutions per minute. They were built by the ship and machine building concern " Germania " at Berlin-Tegel. The shafts of the dynamo engines are fastened directly on the cranks of the steam engine.

The electric plant is constructed after the expansion principle of 110 volts. The ventilators were furnished by G. Schick of Bockenhein near Frankfurt a. m., and Garbe, Lahmeyer & Co., of Aachen supplied the necessary electric motors.

The cinder breaking plant was furnished by the Fr. Kruppe-Gruson Works. The dust accumulating in this plant is taken along by a blower and brought to a large reservoir where it is dampened down with water.

The architectural work was done by the engineering building master, Caspersohn; Architect Siegler was entrusted with the supervision of the erection of the crematory.

COST OF BUILDING.

The cost of building the crematory would be about as follows:

		Marks.
1.	Foundation	15,000 00
2.	Iron construction of the furnace room	51,000 00
3.	Mason work on furnace room including machinery and boiler room	29,000 00
4.	Chimney exclusive of foundation	17,000 00
5.	Machinery and running trackage, including electric light plant	55,000 00
6.	Boiler	16,000 00
7.	Furnaces	130,000 00
8.	Ventilators	11,000 00
9.	Cinder or clinker breaking apparatus	19,000 00
10.	Swing apartments of manager of plant	19,000 00
11.	Scale with watchman's house	3,000 00
12.	Store house or shed	3,000 00
13.	Transport wagons	30,000 00
14.	Miscellaneous as fencing in of plant, laying out of garden, steam and water fittings, baths, furniture, implements and apparatus as well as other small improvements and proper inspection of buildings in construction, etc.	46,000 00
	Total	480,000 00

The commencement of operation of the combined plant began under many difficulties on January 1, 1896. The furnaces which were last completed could not be used until the middle of January because they were not sufficiently dry to withstand the blowing process. The majority of the workmen were as yet unacquainted with their duties as well as the garbage collector, who began a five 'years' contract under date of January 1, 1896, with new personnel, new horses, new wagons and new harness. The plant was therefore handicapped to such an extent that it could not do at that time what it was expected to do and considerable of the garbage collected had to be disposed of otherwise.

The table 10 is showing the working results of the institution from the time of beginning operation January 1, 1896, to the end of March, 1897, illustrated in graphical form.

The first section is showing the daily receipt to the institution equalized to the middle of the week.

The dotted line surface shows the unconsumed or uncremated remaining parts of garbage, but in about fourteen days, in connection with running the institution on Sundays also, the accumulation of garbage has ceased.

The inadequacy of power for the furnace, cranes and other contrivances caused by the inaccessibility for smoke by the workmen to regulate the dampers properly so as to conduct all the combustible gases to its proper places for the production of heat and steam were only temporary obstacles.

But, however, the Horsfall Company by their skilled handling of the whole contrivance by their own men have accomplished satisfactory results as per stipulations in contract without any extra or emergency firing under the furnace. Steam boiler consuming 5,000 kg. of garbage per retort in 24 hours in eighteen retorts battery except the power furnishing boiler for the illumination had to be fired extra.

In the last section of table 10 is shown the consumption of coal (for all positively state that no coal is required); but by the skilled handling of the attendants the consumption of coal is greatly diminished, but such economy began to be most visible by the use of dry air blast which since March, 1896, has been in constant use and from that time not only the assisting firing has ceased, but the developed heat from the several gases consumed in the furnace is passing freely through the smoke duct as an unemployed surplus. Only in starting the furnace some parts of the plant require fuel assistance.

This latter result may permit the institution to return to the former rest or discontinuance of Sunday work. The experience of the attendants handling the furnace enabled them to charge the furnace for twenty-four hours in such form so that the furnace remained in a normal state of heat. This operation is accomplished by carefully closing the furnace and leaving the smoke-stack damper open to minimum margin, and at 9 o'clock Sunday morning the steamer boilers hold enough pressure to discharge the last arriving wagons, and by the addition of 200 or 500 kg. of coal to the assisting boiler, fire is sufficient to restore the required energy of the same, and the meagerly burning fire in the furnace is by the blast of blowers in a short time in full heat again. In beginning the operation of six experimental retorts the work of the apparatus was divided in two parts, with a space of time left between hours' work of two crews, but it proved of disadvantage to the efficiency of the fire and hence a division of eight hours' work was taken in order.

The exhaustive work of the furnace men, the feeders and the cinder cleaners at ten hours' term has proved that the eight hours' term became more profitable, accomplishing better results in every respect.

The workmen are not permitted to leave the premises during the working time, but can receive refreshments at their respective positions. In consequence of an increased capacity of the furnace cells, a large number of the cells should be dispensed with.

The second curve of table 10 contains the cell hours which represent the daily time of work in the crematory. It can be seen that for a long time the cremation of the garbage was done with only half the number of cells working, and during the last winter, when the crematory was overburdened with work, only 30 cells were put in operation.

The average working capacity with twenty-four hours is given in table 10 in the third curve. This capacity at the opening of the crematory was only 4,000 kg. In the course of time it increased to 7,500 kg., and during the winter months it again dropped down to 6,500 kg. as the result of the larger volume of ashes. In one year, from April 1, 1896, to March 31, 1897, 47,327,693 kg. of garbage was consumed in the crematory, and the working capacity of one cell within twenty-four hours was 6,406 kg. on an average during the year. But it must be remembered that the working capacity per cell during the first months of the opening of the crematory was far behind the above average. As a result of the last eight months, the average capacity of 7,000 kg. can be taken.

Had the crematory been in full operation with all the 36 cells during the 313 working days 78,876,000 kg. of garbage would have been consumed.

Upon request of several municipal administrations of other cities, trials of cremating the garbage of such cities were made. The result of these trials are shown in comparison with the average capacity of cremating the Hamburg garbage.

It must be remembered that the trial with the garbage from Essen was performed under the most unfavorable use of steam ray-blast.

The poor result of the first Berlin trial can likewise be assigned to the reason of using the steam ray-blast, although the manner of separating the garbage of the different quarters of this city for the purpose of their separate cremation, and the delivery of double the quantity of very bad garbage from the east quarter of Berlin, had done a great deal to accomplish the poor result of the trial. The second Berlin trial has shown this beyond a doubt.

The trial with garbage from Magdeburg was a pronounced failure. The reason of this failure may be prescribed to the use of bad brown coal in Magdeburg for heating purposes, which leaves great quantities of dead ashes and the mixture of house garbage with street sweepings.

Very often trials in cremating the street sweepings from the inner districts of Hamburg were made, and it was proven that this material in times of dry weather could be burned without adding coal material, but the fires were kept up under great difficulty on account of containing no coal particles.

As soon as street sweepings and house garbage was burned together all difficulties were overcome. The burning of street sweepings alone could not be accomplished satisfactorily, as the contractor who gathers sand and delivered it at the crematory deducted only 50 pfennigs per 1,000 kg., so the cremation could be performed only at an exorbitant cost.

One of the important factors in judging the operation of a crematory is the temperature to be attained for the process of cremation. The statements of the English plant on this point differ a great deal, and investigation showed that the measurement of temperature was taken at different places, and comparison of them was out of place altogether. In some instances the temperature was tested in the fire itself through melting substances. Sometimes it was obtained over the fire or in the smoke channel of the furnace. It is, therefore, natural, that temperature as the result of the momentary condition of the fire or of the cleverness of the laborer must differ.

In Hamburg this is the reason why the temperature of the gases generated by smoke are not tested in the single furnaces, but in the main smoke channel before they enter the boiler. On the long run to this place of observation the above-mentioned gases are sufficiently mingled to show their average worth. The gases have, no doubt, in this way cooled down somewhat.

In the month of February the following results by full operation were reported:

Highest temperature, 760° C.

Average maximum of day, 664° C.

Average temperature, 580° C.

Average minimum of day, 517° C.

Lowest temperature, 450° C.

The testing apparatus was a Graphit-pyrometer made by Dreyer, Rosenkranz and Droop, of Hanover. It may be said that during the operation with steam ray-blastings the temperature seldom went over 400° C. The analyses of these gases differ just the same when the off gases of the single cells are examined.

The test of these examinations are, therefore, taken from the main smoke channel directly before the boiler. The master mechanic of the University of Goettingen, W. Appel, has sent an apparatus so as to make the examination as sterile as possible. The average attained by a number of analyses through the operation of 18 cells of the crematory was:

	Per cent.
Carbon oxide	0.03
Carbonic gases	5.00
Oxygen	14.92
Nitrogen	80.05

The chimney draft on the furnaces differs during the operation to between 10 and 15 mm. water column. The pressure produced by the undercurrent of the ventilator is about 35 mm. water column.

The column of air produced by one ventilator at repeated measurements and by the operator of 18 cells is given as 54 cu. m. on an average per second. It must here be taken into consideration that the undercurrent of a cell is shut up as long as the same is in operation. The real undercurrent in the separate cells could therefore be judged at about 4 cu. m. per second. The pressure of the air on leaving the ventilator is about 60 to 70 mm. water column. The triangular shape of the smoke channel of 0.2 q. m. per cell have proven to be satisfactory. Finally it is to be remarked that the work of the institution is hardly to be noticed outside of the same. The refuse is kept in a close room and no odors reach the outside. The light, brown-colored smoke gases escape unnoticed through the tall chimney. Only by very depressing atmosphere will the smoke, as in any other factory chimney, descend and be noticeable in the vicinity. A few complaints about annoyance from dust by the nearby bathing place was caused by a stoppage of work of the slag breaker, causing the unbroken slag in the opening to be piled up and a strong wind to carry the dust beyond the boundary of the institution. The chief cause of objecting to such an institution by those living in the vicinity might be found in the noise of the numerous carts going and coming day and night, but this could be avoided by the construction of a noiseless pavement in the principal street leading to the crematory.

Notwithstanding the many improvements already made, the annoyance from dust natural to the material to the employes seems still to be a source of trouble. Protective measures such as dust glasses, mouth sponges and respirators do not meet with the approval of the employes. The men during working hours wear special clothes which are washed every week and are required regularly before leaving the place to take a shower bath.

RESIDUE OF CREMATION.

The residue is generally given by the English crematories at 33 per cent. of the weight and at 25 per cent. of the bulk of the refuse cremated. In Hamburg the residue shows after repeated weighing an average of 59.5 per cent. of which 11.3 per cent. is ashes and 48.2 per cent. is slag. The weight of the refuse is on the average about 550 kg. per cu. m., that of the broken slag, i. e., ashes in the average 830 kg. per cu. m. Taking the round figure of 60 per cent. it will show:

Residue, 1 cbm., refuse $\frac{550.60}{100} = 330$ kg. or $\frac{330}{830} = 0.40$ cbm. of residue, therefore 40 per cent. of the dimensions of the supply. As experiments with the refuse of other German cities have given similar results, although a trifle better figure, it seems that the refuse from German cities is constituted entirely different from that of English cities, unless the English figures have been taken from such cities as London or Manchester-Holttown, where the refuse is sifted before cremation.

The residue has been used in a small measure unbroken for filling in purposes on the property of the crematory and for the free distribution to private persons, the larger part however was broken and sifted. The various division of the sieves have holes of 5 mm., 25 mm. and 60 mm. diameter. In sifting the residue inclusive of ashes, the following percentage according to space is obtained: 16 per cent. fine grain, 50 per cent. medium grain and 34 per cent. coarse grain. The weight of the material complete in a dry state per cubic meter is:

	Kg.
Coarse slag	800
Medium grain slag	840
Fine slag	870
Fine ash	570

in a moist state (after having been piled up in the open) about 10 per cent. more. The prepared material is sold for state or private use at the uniform price of one mark per 1,000 kg. deliverable at the crematory. For convenience of the consumer it is also sent free at destination at a charge of 30 pfennigs (17½c.) per wagon load for loading and with agreement of the contractor a charge of 75 pfennigs to 1.20 marks per 1,000 kg. according to distance to be carried. making the net cost at destination 1.85 marks to 2.25 marks per cubic meter. All residue finds a market and in the building period of last year, the demand could not be satisfied. In the winter months when there is no building the residue piles up, but already in March the demand again was greater than the supply. A broken slag is used in the construction of promenades in the suburbs, the coarse material for the groundings and the medium for the top covering. The broken brick or slag from private boilers formerly used for such grounding costs 4 marks per cu. m. at the place of building and very often has to be prepared therefore, which is not the case with the slag from the crematory. Gravel so often used as a top covering costs 3.90 marks per cubic meter. Therefore the slag of the crematory offers great advantages to the purchaser.

The fine grain can be used wherever common sand is used, which sells in Hamburg free at destination at 1.90 to 2.70 marks per cubic meter, such as for groundings for street pavements, for sprinkling on frozen pavements, etc. The medium grain is used for ceilings, and cement pavings in the same measurements as relate to gravel. Trials showed that pavements made with gravel 7 cm. strong, 84 cm. long and 60 cm. broad broke after 28 days hardening by a pressure of 628 kg., while the like made with slag resisted a pressure of 672 kg., showing that those made with slag are fully as good as those made with gravel. Similar results were achieved through experiments made in Berlin by Government Architect Grohn.

Experiments have been made for its use in the preparation of mortar.

It was observed that dust, fine cinders and clinkers in the ball mill mixed with the usual white lead and sand produced a sort of hydraulic mortar. In consequence of the very low price of cement in Hamburg, it is very doubtful if this production of the crematory could compete with the genuine stuff.

	1 Fine cinders broken in the cinder-breaker after this ground in the mill. Per cent.	2 Ashes from the ash-pit of the furnace cell ground in the mill. Per cent.	3 Flying ashes out of the smoke channels ground in the mill. Per cent.
a) Direct rules:			
Water by 105° C	2.8	1.0	0.9
Loss through glowing heat of dried substances by 105° C	1.6	2.0	1.0
Salficles, bound sulphurated hydrogen	Traces	Traces	Traces
Arsen	Traces	Traces	Traces
Carbonic acid	Traces	Traces	Traces
Nitrogen	None	None	....
b) Watery extraction:			
Chlorine	0.17	0.53	0.38
Sulphurous acid	0.01	0.0192	0.00288
Oxidation i. e. organic substances easily oxidized	0.056	0.1675	0.0156
c) Extraction with muriatic acid:			
Insoluble residue in muriatic acid exclusive of soluble silicic acid	61.2	55.9	51.5
Soluble silicic acid in alkalis (SO_2)	11.7	12.0	15.5
Iron oxyd. (Fe_2O_3)	7.4	7.8	9.8
Aluminum oxyd. (Al_2O_3)	2.6	4.6	2.9
Magnesia (MgO)	0.7	1.2	0.8
Lime (CaO)	5.6	7.1	6.5
Phosphuric acid (P_2O_5)	1.42	1.3	1.35
Sulphuric acid (SO_3)	1.2	2.7	3.7
Sodium oxyd. (Va_2O)	2.0	2.8	3.6
Potassium oxyd. (K_2O)	0.7	0.4	0.8

To ascertain if there is anything of the leavings which might have been used by farmers as manure, a chemical analysis was made which brought no result and it is furthermore highly probable that with the price of manure as it stands to-day if there should be anything in the leavings of which such use could be made, that the cost of transportation would effect the saving and the farmer would hardly, if at all, benefit by it.

The fine flying ashes which gather in the smoke chamber have also been used as manure, but not so much as for the manufacture of art stones as well as a filling material between the double walls of vaults and safes.

The old metals gathered in the institution are mostly used for the manufacture of enamel ware and are sold exclusively to one dealer for 7.05 marks for 1,000 kg. Old enamel ware which comes to the crematory for disposal cannot be used over except in frosty weather when the enamel can be separated from the iron. In the course of a year as much as 190,000 kg. of metal was obtained.

COST OF OPERATION.

The question about cost of operation of our crematory was put to the manager of the same so often that we will answer them in the best and most correct manner.

If we count 4 per cent. interest and amortization of the cost of building 480,000 mk. it will make 19,200 per year. The plant of 36 cells with a capacity of 7,000 kg. per day and cell during a year of 313 working days, would burn 78,870,000 kg. garbage; therefore it would cost 24.3 pfennigs to burn 1,000 kg. garbage.

About the cost of operation a final statement cannot be given in consideration of the plant being in existence only a short time. Repairing and rebuilding was up to date not of great importance. It is a fact that the repairs amounted to and will not go over 16,000 marks per year, or 20.3 pfennig per 1,000 kg. of garbage.

For small articles such are oiling and cleaning material, coals, illuminations, etc., when plant is in full operation, the amount expended for one year would be about 4,000 marks, or 51 pfennigs for 1,000 kg. of garbage.

The yearly salaries and wages for the operation of the full plant are as follows:

	Marks.
Superintendent	2,400
Night watchman	1,900
Two machinists	3,400
Total	7,700

B. SALARIES (313 days).

	Marks.
Transport	7,700.00
Three workmen for preparation work, per day 4.20 marks	3,943.80
Thirty-six furnace laborers, per day 3.80 marks	42,818.40
Eighteen garbage feeders, 3.60 marks per day	20,282.40
Two stokers, 3.60 marks per day	2,253.60
One faucet tender, 4 marks per day	1,252.00
Fifteen laborers to attend to ashes, etc., 3.60 marks per day	16,902.00
Three laborers to clean up and furnish room, 3.30 marks per day	3,098.00
Two watchman, 2.50 marks per day	1,565.00
Total	99,815.90

or 1,265 marks per 1,000 kg. of garbage.

The total cost for 1,000 kg. of garbage according to the above figures are as follows:

The total cost for

	Marks.
Taxation and amortisation of plant	0.243
Keeping plant in order	0.203
Miscellaneous articles	0.051
Salaries, etc.	1.265
Total	1.762

From the cost of cremation must now be subtracted the cost of carting away the ashes, etc, exclusive of the cost of transport, as follows:

78,876,000 kg. unrath'a 60 proc.

The amount of ashes, etc., remaining from the garbage is:

47,325,600 kg., per 1,000 kg., 1.30 mks. = 61,523 mks.

320,000 kg. old metal per 1,000 kg., 7.50 mks. = 2,400 mks.

Value of extra heat as hard coal.

100 H. P. 313 days per H. P., an hour figured only at 1 kg. shows as follows:

751,000 kg. hard coal at 1,000 kg. 12 mks. = 9,012 mks.

Total for 78,876,000 kg. of garbage, at 72,935 mks. or per 1,000 kg. of garbage, 0.925 mks.

Figuring in comparison with the receipts, the cost of cremation of 1,000 kg. of garbage would be 1.762—0.925 = 0.837 mks.

As the plant at present is not operated to its full capacity, and the cost of operation remains the same, and as in the future the value of the extra heat which we figured as receipts in the above figures is not produced. The cost of cremation for 1,000 kg. of garbage in the past year practically amounts to 1.441 mks. including and to the amount of 1.035 mks. excluding the amortisation and taxation of the erection of the plant.

These expenses are caused by the failure to reduce the distance of transport to the plant, and show as follows:

The garbage contractor, when operation was begun, figured that he could make two trips with a team and wagonload of ashes, etc., to the outskirts of the city per day. The price for a team (two horses and a wagon) in Hamburg including amounts to 12 marks per day, hence one trip would cost 6 marks. At the present time the contract for carting garbage to the plant calls for three trips a day for a team within the regular working hours. At the beginning the workmen found it very difficult to make the third trip, but at present they have overcome this difficulty and have at times made four trips a day. If we figure at three trips, a load would only cost 4 marks, whereas formerly 6 marks were paid, and as every load is 2,000 kg. of garbage, the amount saved would be 1 mark on every 1,000 kg.

Taking the above facts into consideration, the Hamburger crematory expects in all branches of its plant to come up to all expectations. The hygienic purpose of the plant has been reached without increasing the cost of operation in the least. By using all the cells and making use of the large amount of extra heat, the amount of ashes, etc., would be greatly reduced, thereby showing a small reduction in the price of carting the ashes, etc., to the outskirts of the city.

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1. Topographic plan of Hamburg.
2. Situation of the crematory.
3. Outer view of the crematory.
4. Wagon for carting ashes, etc.
5. View of the furnace room, etc.
6. Inside view of the furnace room.
7. View of the chimney.
8. Construction of the furnace.
9. Plant for sifting and grinding cinders.
10. Graphic tables of operation.

Exhibit G.

OTTAWA, *January* 2, 1900.

To Dr. A. H. DOTY, *Health Officer's Department, New York, N. Y.:*

Dear Doctor Doty.—I beg leave to acknowledge receipt of your letter dated 27th ult., with regard to the question of the disposal of city garbage.

In reply I beg to say that I have not given any special consideration to the subject of garbage disposal, and am not therefore in a position to offer you any expert views on the subject. I am sending a copy of your letter to the secretary of the Provincial Board of Health of Quebec, the officers of which board are in Montreal, and I am requesting him to obtain and forward to you as fully as possible the information as to the disposal of garbage in Montreal with a detailed description of the apparatus in that city.

Very truly yours,
F. MONTIZAMBERT, M. D.,
Director-General of Public Health.

CONSULATE-GENERAL OF THE UNITED STATES OF AMERICA,

BERLIN, *January* 23, 1900.

Dr. ALVAH H. DOTY, *Health Officer, Port of New York:*

Dear Doctor Doty.—In reply to your letter of the 11th inst., I have to say that the disposal of garbage and ashes is very well managed in Berlin by private companies of which there are about twenty. The principal of these are:

Berliner Abfuhr Gesellschaft.

Gesellschaft für Staubfrei Müll Abfuhr.

Müll Abfuhr, System Eger.

Carl Scheller, Allgemeine Technische Müll Abfuhr.

These are names simply as an example of the private firms or companies, who each have an outfit of wagons so constructed as to receive the sheet iron tanks which are about three or four feet in height with a closing lid cover and handles by which it can be lifted by two men. These tanks are set in the court or back yards of buildings and receive ashes and other garbage from all the occupants of the place during the twenty-four hours. The proprietor of each house or building has a contract with the company which serves his district, and pays a certain amount per annum for the service of carrying away and disposing of the garbage and ashes from the building. Several of the companies make a daily service, others, some a weekly or tri-weekly, but in all cases the ashes and garbage are required to be kept in closed tanks which are as stated carried bodily, set up on the platform wagons and hauled away, being replaced at the same time by an empty tank, which remains until filled and is then taken away in the same manner. One of these companies, I do not know which, has an establishment in the Genthiner Strasse, where the garbage is burned. But the others, all so far as I can ascertain, haul the matter to some point in the suburbs, where they have permission to fill up low waste land in vacant lots or along the river.

There is therefore nothing peculiar or particularly interesting about the garbage system of Berlin. What is particularly interesting here is the sewerage and the sewerage farm system, one of the best of its kind probably in the world. This has been admirably described in an article written by Mr. Albert Shaw for the Century Magazine, where it was published in the July number for 1894. The same system is also well described in a report made by Vice-Consul Zimmermann and published in Consular reports, No. 173, for February, 1895, which you can easily obtain if desired from the Department of State.

Hoping that this may be satisfactory, I remain, my dear doctor,

Very sincerely yours,

FRANK H. MASON,

Consul-General.

P. S.—As an example of how the system works, I may mention this Equitable building in which the Consulate is located. We use for this building six tanks, or "Kasten" as they are called, each of which is emptied daily and cost 9 marks per month, and that is 54 marks per month or 648 marks, equal to $154 per year for the entire building.

At my house, which is a flat in an apartment house, the landlord pays for the disposal of garbage and ashes, so I do not know what it costs. As a rule, the owner of rented property pays this tax. The unit of the entire system is the covered sheet iron tank or "Kasten" which is about three feet high and twenty inches square, with a tight fitting lid and handles so that it can be lifted and carried by two men. It is kept closed so that dust is as nearly as possible avoided in all seasons and weathers.

FRANK H. MASON.

CONSULAR SERVICE, U. S. A.,
MOSCOW, *January* 27, 1900.

Hon. A. H. DOTY, *Health Officer, New York:*

Dear Sir.—I am in receipt of your letter dated the 11th inst., and in answer beg to state that all garbage and ashes in Moscow are taken away from each house in an ordinary cart, dumped in an open field, which the city contributes for this purpose and there it lays until it rots, or sometimes chloride of lime is thrown over the garbage. Each proprietor of the house has an ordinary wooden box made with a lid to it, standing in the back yard and when the box gets filled the proprietor hires carts from a contractor and it is taken away, at his own expense. Occasionally an officer of the sanitary department visits the yard and if he finds the yard not in order, he informs the proprietor to have it put in proper condition in a limited time, and in case he does not obey his order, a complaint is filed against him at the petty court.

Respectfully yours,

SAMUEL SMITH,
Vice and Acting Consul.

CONSULATE OF THE UNITED STATES OF AMERICA,
ST. PETERSBURG, *January* 27, 1900.

A. H. DOTY, Esq., *Health Officer's Department, Quarantine, Port of New York:*

My Dear Doctor.—Yours of January 11th is at hand. St. Petersburg, like the rest of Russia, is far behind American cities in all matters relating to sanitary matters. They simply dump the garbage and ashes where they can find a low place.

As you know, the death rate here is very large, but I cannot hear that any steps are being taken to remedy the matter in the near future.

Very respectfully,

W. R. HOLLOWAY,

Consul-General.

Department of Health,

Montreal, Can., *February* 17, 1900.

A. H. Doty, M. D., *Health Officer, Quarantine, N. Y.:*

Dear Sir.—Our garbage destructor is a modification of the Manlove-Elliott system. It gives full satisfaction.

L. LABERGE,

Medical Health Officer.

Exhibit H.

Description of the New Garbage Crematory at Berlin.

[Das Buch fur Alle.]

In all large cities, but particularly in Berlin, where hard coal is principally used for firing purposes, large quantities of garbage, i. e., refuse and ashes, are gathered. Up to now this was carted to empty lots and places in the suburbs for use for the filling up of low lands until warning voices called attention to the fact that these depositories of the garbage might become breeding places of dangerous epidemics. The suburbs of Berlin now protested against the dumping therein of the refuse of the empire's capital, and a new method of disposing of the same had to be considered. Therefore, in accordance with the plan adopted by English cities, the destruction of garbage by fire, experiments with which had proven satisfactory, a crematory after the patent of Engineer Carl Wegener was built on the property Nos. 14 and 15 Gitschiner street, adjoining the water. (See illustration on page 312.) It is constructed of iron and fire-proof brick and is three stories high. The refuse, which is brought to it in tightly closed iron boxes capable of holding one-half cubic meter either by water or on land in carts, is lifted by means of an electric crane to the third story, where it is fed into the same through funnel-shaped openings (see illustration on top at left hand), and carried further by means of rotary drums lying in an inclined level on the second story (shown by the illustration on bottom on left). The furnace, into the top of which the refuse falls, is heated by means of coal dust and is supplied also at the top by means of a special contrivance (patent Wagener) with a current of hot air intermixed with coal dust, in the scorching heat of which the refuse is smelted and airified.

This smelted refuse forms at the bottom of the furnace a liquid glacial slag, which, dropping into a water basin, become hardened. This slag can be used in various industries and by the sale of same part of the running expenses are defrayed. As far as the question of health is concerned, no better solution is well-nigh possible. Since spring, 1899, the destruction of refuse by the Berlin garbage crematory is enormous, and on an average 1,000 to 1,200 hundredweight of refuse are cremated.

It is to be hoped that other large German cities in which the refuse question has become prominent will imitate the example of Berlin and adopt the above-described process.

Exhibit I.

HEALTH DEPARTMENT, OLD COURT HOUSE,
BOSTON, MASS., *January* 17, 1900.

DR. A. H. DOTY, *Health Officer, Quarantine, S. I.:*

Sir.—Your letter concerning the disposal of garbage in Boston was duly received, but owing to busy conditions and absence I have neglected to answer sooner.

The garbage of the city is disposed of at one of the promontories of Dorchester bay, Boston harbor, about six miles from the city by the same company and the same process as you have for the cities of New York and Brooklyn. It is the reduction system. There have been complaints against the bad odors from this plant by the residents of Dorchester, South Boston and elsewhere at distances of from one to two miles. These complaints were investigated last summer by the board of health of this city and found to be well founded and the garbage plant pronounced a nuisance by the board of health and the case placed in the hands of the mayor and superintendent of streets. This was done on August 25th; nothing as yet has been done.

It has been my personal judgment for at least 10 or 12 years that it was not practical to treat garbage by this process within any reasonable distance of habitations, and that the process by cremation is far superior from a sanitary point of view. Cremation can be performed within any city, with short hauls and, with the use of other refuse combustible material, the cost for coal should be very light. I mean by this that waste combustible material which is left to be consumed after that of a commercial value has been removed. I believe thoroughly in the separation of garbage, so called, from ashes and other dry combustible materials, so that whatever may be of commercial value can easily be selected at the cremation plant and all residue be utilized in the process of burning the garbage. Such plants might be placed in different sections of any city, so that the cost of long hauls could be avoided.

Yours very truly,

SAMUEL H. DURGIN,
Health Commissioner.

MILWAUKEE, *January* 13, 1900.

Dr. A. H. DOTY, *Quarantine Officer, Staten Island, N. Y.:*

Dear Doctor.—I am in receipt of your communication dated the 10th inst., relative to the disposal of garbage.

I will state that during the years of 1890-94, I was the commissioner of health of this city and had a great deal of experience during these four years with the question of the disposal of garbage. I visited nearly all of the cities in the country where garbage was being disposed of in any way considered to be sanitary and the city finally let a contract to the "Merz Co." for the disposition of garbage and animal matter and the plant was constructed fourteen miles out of the city and was in operation for five years. This was the most satisfactory way of disposing of garbage and animal matter that this city has ever had. The contract provided for the disposal of all household garbage and garbage collected from hotels, boarding houses and restaurants, etc., also of all of the dead animals both large and small and the animal matter from slaughter houses, etc. The garbage was collected and transported by boat on the lake to the plant, as at that time we could not get the railroad company to handle it. This was a very satisfactory method. At the end of five years, I being out of office having declined to serve a second term, the council being changed, trouble arose with the company and the contract was not relet. Since then the garbage has been disposed of by being taken into the country and buried, and much dissatisfaction has resulted therefrom. Recently a contract has been let with a company to build a plant of some description, I think cremation is the system, in a certain part of the city, but an injunction was issued preventing the building of the plant and the matter thus remained. I have not investigated the subject very thoroughly during the past few years, but my experience teaches me that in small cities the modern method of cremation is probably the best method of disposing of this material. However, the disposal of garbage is a problem which every city must decide for itself. What system will be operative and satisfactory in one city will not be in another as the character of the garbage varies very much in different localities. A very important point is to have the animal and vegetable matter and the refuse from the kitchen kept separate from ashes and other material of that nature. If they are both mixed together it becomes a very difficult problem for disposition. If kept separate, this is one of the first steps to a successful disposition of the material. In large cities, I believe in some process of desiccation whereby the products may be utilized and sold on the market, such as the oils that are extracted, which are quite valuable for soap greese, candles, etc., and the other material can be utilized in the manufacture of fertilizers. I believe from an economic standpoint it is a great mistake to cremate this material in large cities. But a small amount of garbage can be disposed in any one plant inside of the city limits as the very fact of the number of teams necessary to transport the material to one place creates a nuisance, hence: If plants are to be located inside of the city limits, they should be small and several plants for a large city should be provided. The most satisfactory way is undoubtedly to have the plant located outside of the city limits. Then if properly managed under police regulations the modern systems of cremation or desiccation many of them can be operated successfully and in a sanitary manner. These are simply and briefly my opinions relative to the subject at the present time. Any further information I can furnish, or any special questions you desire to ask, I shall be pleased to answer at any time.

Very truly yours,

U. O. B. WINGATE, M. D.,
Secretary.

DEPARTMENT OF HEALTH, CITY OF CHARLESTON, S. C.,
January 25, 1900.

Dear Dr. Doty.—I am in receipt this morning of your note as to garbage disposal. In reply I beg to say that the removal of garbage from the city of Charleston during 1899 cost $21,772.28.

There were 42,704 dump cart loads removed. These carts are supposed to hold about one cubic yard—they are generally quite well filled.

The garbage is removed from the city every day in the year except Sundays and Christmas day. The garbage is as a rule out of the city about twelve o'clock. What is left amounts to but little and is certainly removed before two o'clock. The city owns the carts and the mules (which are generally used, being found more suitable than horses on account of their endurance). The drivers are hired by the city and are of the negro race. The animals are stabled in a large and commodious building and there is a competent man employed to look after the care of the mules —(white).

There is a superintendent of carts and an assistant superintendent of carts, both white. These carts carry out the garbage during the forenoon and during the afternoon are employed in hauling for the city, helping to build streets and repair them.

This is a part of the street department as the carts are used for the city work. The hauling is however to a certain extent subject to this office in this way. The sanitary inspectors are required to see that the garbage is properly removed; any imperfect work or inattention would be reported to this office.

The garbage is removed to the salt water marsh land uninhabited (you call them, I think, meadow lands). Good roads are being made through these lands. It is salt water land. The tides flow in and out. The offal and other quickly putrescible material is buried in the accumulating garbage. There are two men at the end of the garbage pile or road who distribute the garbage as it is dumped. This service has been in use about twenty years and has proved to be very satisfactory.

We have no process of cremating the garbage.

The method is open to the objection of the storing a quantity of decomposable material which takes a certain time to go through the process. These lands are not however inhabited and no one suffers. We have not noted any disease occurring in connection with our disposal. It would not do for a very large city where people live, but it has satisfactorily answered our wants. The ownership of the carts gives absolute control and thus gives opportunity for certain work; wind or weather, the carts are out at work and it must be a very bad day that keeps them in.

If I have failed to give you any information that you may want I will be glad to supply it if my attention is directed to it. As a rule I am strongly of the opinion that cremation is the proper solution of the garbage question, but we have not been required as yet to resort to it.

Yours very truly,

H. B. HORLBECK,

Health Officer.

BOARD OF HEALTH, CITY OF ATLANTA, GA.,

January 26, 1900.

Dr. A. H. DOTY, *Health Officer, New York:*

Dear Sir.—Your letter of the 16th inst., relative to our method of disposing of the garbage, etc., of this city received. In reply will state we have after painstaking and careful experimentation with all the usual and known methods, adopted cremation. We have in operation now a furnace of 150 tons daily capacity, which has been doing satisfactory work since the 11th of last December. It takes garbage of every kind, night soil and hotel swill. So far the combustion is complete, ashes also are taken in in small quantities where they cannot be separated from the garbage. The furnace that we are using was planned and built by two Atlanta men The sections or divisions are so arranged that each is independent of the other. Repair 'can be made without suspending entire work. It is constructed entirely of brick with fire brick at the hottest points. Its location is in the heart of the city, only half a mile from the Central depot. There is no bad odor or smell and practically no smoke. The garbage furnishes the entire fuel, except coke in small quantities is used as a precaution. The cost of construction is less than that of an ordinary furnace. Excuse me for going into detail in this matter, but it is a question of great importance and believe you will be interested.

In regard to your inquiry about the separation of the ashes and garbage, will say that we have a rigid ordinance on this subject requiring all hotels and houses to keep the ashes and garbage separate, furnishing their own receptacles. This can be done very well, except at the hotels where it is almost impossible to make them keep garbage, water and swill apart.

If our furnace does as good work in the future as it has since it has been running we will congratulate ourselves that we have solved the amazing problem. Any further information that I can give you will be cheerfully given.

Very cordially yours,
W. C. JARNAGIN, M. D.,
President Board of Health.

CITY OF ST. LOUIS, HEALTH DEPARTMENT,
January 30, 1900.

A. H. DOTY, *Health Officer, Quarantine, Staten Island, N. Y.:*

My Dear Sir.—Yours of the 22d, addressed to the president of the board of health, has been referred to me. Press of business has prevented my answering you sooner.

You ask for statistics in relation to the disposal of garbage. This city is estimated to have 640,000 inhabitants. The city has made a contract with private parties for the collecton of garbage and dead animals. The contract requires all the garbage and dead animals to be collected daily and delivered in the works of the Reduction Company. The garbage from hotels, restaurants, tenement houses, dwelling houses, the refuse from market places and meat shops, and the refuse from slaughter houses is included. From the refuse from slaughter houses the contractor takes just what the parties wish to give him.

The price paid for the collection of this garbage is $10,200 a month.

The city has another contract with the St. Louis Sanitary Company for the reduction of garbage, which garbage is treated by the Merz system. The city pays $1.80 a ton for each ton up to 100 tons daily. All over 100 tons daily is treated free of charge. The amount of garbage collected now is about 75,000 tons annually. The greatest amount of garbage collected is in the months of July, August and September.

The works of the St. Louis Sanitary Company are two in number. At one of the works there is only received and treated dead animals; at the other works all the garbage is treated. The capacity of these works where the garbage is treated is about 400 tons a day. These works are in good order, well equipped and are operated without creating any nuisance.

The garbage when first received is steamed, then the tanks are drawn and tin cans and such matter are extracted. Then the garbage is placed in dryers, from the dryers, it goes to the benzine by which process the grease is extracted, and then the residuum is ground up.

No ashes or manure are collected with the garbage. Ashes and manure are disposed of by the citizens themselves, manure going partly to the river and partly to farms outside the city. The ashes are partly used by the Granitoid Pavement people and the balance used to fill up the low places.

You ask what my opinion is? I believe that the Merz system, where the works are properly constructed and properly managed, is a good one, and while the city is now paying a very good price for the disposal of the garbage, I believe at the end of the contract better terms can be had.

I enclose you the ordinance in relation to the collection of garbage, also the ordinance authorizing the contract for the disposal of garbage.

Our system is a good one, except in two particulars. It is difficult to compel the citizens to keep their garbage in proper receptacles and the condition of our outside territory. i. e., territory where the streets and alleys are not paved, compels the use of wagons, which I do not believe are as thoroughly sanitary as the steel carts that are used in many places in the East. Here the wagons are built of wood and the inside is lined with zinc.

If there is any point on which you wish information, let me know and I will be happy to furnish it.

Respectfully,

CHARLES W. FRANCIS,
Chief Sanitary Officer.

CITY OF DENVER,
BUREAU OF HEALTH,
DENVER, COLO., *January* 29, 1900.

Dr. A. H. DOTY, *Health Officer, Port of New York:*

Dear Sir.—The manner in which our city disposes of her refuse matter is as follows:

The garbage is collected by ranchmen in closed iron tanks and delivered outside the city limits where it is fed to hogs.

It is handled at a very small cost to the city, but not satisfactorily to the Bureau of Health, who believe that all refuse matter should be cremated.

The ashes are collected by teamsters at owners' expense and hauled to city dump.

If there is any further information needed, I will be glad to give it to you.

Respectfully,

T. J. CARLIN, M. D.,
Health Commissioner.

CITY OF INDIANAPOLIS,
DEPARTMENT OF PUBLIC HEALTH AND CHARITIES,
INDIANAPOLIS, *January* 25, 1900.

Dr. A. H. DOTY, *Health Officer, New York City:*

Dear Doctor.—Replying to your note of inquiry of recent date, the garbage of this city is collected by private contract and by law is divided into wet garbage and dry garbage. The former is defined to be the ordinary refuse from kitchens, such as peelings, scraps of meat, bread, etc. The latter to mean sweepings, tin cans, papers and bottles. These are collected three times a week in the summer and twice a week in the winter. They must be kept in separate vessels and placed as near the property line as possible and yet upon the premises of the citizen.

The garbage is collected and carried to a central station and there placed upon the car and conveyed to a farm of about 160 acres situated just beyond the city limits. Here the company having the contract disposes of the garbage by burning. The Board of Health are authorized to permit other methods of destruction in place of cremation if they desire. We have permitted the company to sort the dry garbage and use the papers, rags, etc., and to treat the wet garbage by chemicals and then to make a low grade of fertilizer out of the product.

Our experience has been that the destruction of the garbage has been accomplished without annoyance to any one except the natural odors arising from handling, the furnaces not being offensive in any sense.

The same has been true of the treatment by chemical means. The company has informed me that the fertilizer made is low grade and would not yield sufficient revenue to pay for its manufacture were it not of use to mix with a higher grade that the company is putting on the market.

We make no provision for the removal of ashes which must be done by the householder at his own expense. The universal use of natural gas as a fuel has made the public removal of ashes unnecessary but the failure of this fuel will soon compel us to make such provision.

Our great difficulty here is the disposal of the contents of vaults and privies. The company having the contract to dispose of the garbage has also the contract to dispose of all the contents of vaults and privies, but this must be delivered to the company at its crematory and at the expense of the householder, as no provision is made for its collection by public contract. The ordinance originally called for the disposal of this matter by burning, but it was soon demonstrated that it was impossible to do this from the large amount of contained water. Then the Board of Health was authorized to permit its destruction in some other manner and at our suggestion the liquid matter was drained off and allowed to run into large tanks and there boiled thoroughly and then run into the river while the solid parts were cremated. But it was soon shown that the large amount of sand contained in the solid matter which had been removed along with the fecal matter would fuse into solid cake in the furnace and ruin it, so now we permit fecal matter to be buried on the farm after being treated with lime and marl.

Very respectfully,

FRANK A. MORRISON, M. D.,

President.

HEALTH DEPARTMENT,

OFFICE SUPERINTENDENT OF HEALTH,

CITY HALL, PROVIDENCE, *January* 25, 1900.

A. H. DOTY, M. D., *Health Officer, Richmond Co., N. Y.:*

Dear Sir.—Your favor of the 16th received. The garbage in this city is collected by contract separate from ashes, which are removed by the householders. The separation is probably as good if not better than any city in the United States. Probably nearly 15,000 tons per annum is collected. The contractor receives 15½ cents per annum per capita. He figures that this pays the cost of collection and a fair profit and he is probably stating the truth, so that practically our disposal costs nothing. The garbage is fed to swine. As the swine are kept many miles from the city, there is no nuisance to us. This is by all odds the cheapest method of disposal. When it is adopted the disposal either costs nothing, or may even yield a revenue.

I believe cremation is cheaper than reduction, simply because a crematory can be operated by the city. Most of the reduction companies figure to make large profits on a short contract and to secure the contract if necessary by unfair means. Cremation can probably be done for from 50 cents to $1 per ton, usually nearer the latter figure.

The Thackeray people claim to be able to cremate ashes and garbage together cheaper that it can be done separately; but I am doubtful whether they can do it.

You ought to know more than I do about the relative advantage and disadvantage of separate and mixed collections, as I believe you lived in New York when mixed collection was practiced there. What do you think about it?

Yours truly,

CHARLES V. CHAPIN,

Superintendent of Health.

Board of Health,

Richmond, Va., *January* 25, 1900.

Health Officer, Port of New York:

Dear Sir.—Your letter of the 16th inst. received. All of the garbage within the city is cremated, and we find the method entirely satisfactory.

The ashes are used in filling old streets, etc.

Yours truly,

W. T. OPPENHEIMER, M. D.,

President.

City Board of Health,

Sacramento, Cal., *January* 29, 1900.

Health Officer, Port of New York:

Dear Sir.—In answer to yours of January 22d will say that our garbage is collected by scavengers and removed to dumping ground outside of city and covered with earth. The method is not satisfactory, and the board of health is striving for a crematory, hoping to accomplish its object in the near future, believing that destruction by fire the only proper method.

Very truly yours,

H L. NICHOLS,

Secretary and Health Officer.

January 5, 1900.

Dr. A. H. Doty:

Dear Sir.—While president of the New Brigthon board of health I became convinced that cremation was the only safe and perfect destruction of putrescent matter. We had a furnace built, and when operated properly there were no offensive odors and the incineration was complete.

During a period of 30 months we cremated 9,962 loads of garbage, 103 horses, 22 cows and 471 smaller animals.

Very truly yours,

I. ALMSTAEDT.

Office of Board of Health,

Terre Haute, Ind., *January* 12, 1900.

A. H. Doty, *Health Officer, Port of New York:*

Dear Sir.—The city of Terre Haute is divided into four districts, each having a garbage contractor who removes the garbage in Studebaker water-tight steel bed wagons. These wagons are owned by the city and the garbage is taken every second day and burned in the Brownlee crematory.

Respectfully,
L. J. WILLIEN,
Secretary.

OFFICE OF HEALTH COMMISSIONER, CITY OF OMAHA,
S. K. SPALDING, Commissioner.

OMAHA, NEB., *January* 24, 1900.

Dr. A. H. DOTY, *Health Officer, New York:*

Dear Sir.—Your communication of the 22d received. The removal of manure and garbage in our city is done by contract. The contractor loads it onto cars and removes it outside of the city limits, where it is used as a fertilizer. He charges the property owner for the services according to a scale of prices fixed by the city council. It is not satisfactory for the reason that the property owner delays moving as long as possible. I believe the city should do the work itself, to be paid from general fund.

I am in favor of cremation, but have been unable to find a satisfactory plant as yet.

Yours truly,
A. K. SPALDING,
Health Commissioner.

ARKANSAS STATE BOARD OF HEALTH,

LITTLE ROCK, ARK., *January* 29, 1900.

Health Officer's Department, Rosebank, Richmond Co., N. Y.:

Dear Sir.—Sorry to say that the garbage is dumped in the Arkansas river. No separation—burning is the only rational method for disposing of some portion of garbage, while some portions may be utilized for fertilizer, etc. We are behind the older States in such matters, and it is hard to educate our lawmakers. I am,

Very respectfully yours,

H. C. DUNAVANT, M. D.,
President.

BOARD OF HEALTH,
LOS ANGELES, CAL., *February* 2, 1900.

A. H. DOTY, M. D., *Health Officer:*

Dear Sir.—In reply to your letter of inquiry, I have to state that the collection and disposition of garbage for this city is by contract. The contracts provide for cremation, or rather as much as possible is to be cremated. The collection is not altogether satisfactory and I think there is a very small per cent. of the amount of garbage collected cremated. This of course is not satisfactory. The garbage and ashes are separated. I think the best manner would be for the city to collect and cremate the garbage for them. The object of keeping all premises clean would be the prime one and all matter could be burned that was, or may be considered, dangerous to public health.

Very respectfully,

L. M. POWERS, M. D.,
Health Officer.

DEPARTMENT OF HEALTH,
COLUMBUS, O., *January* 29, 1900.

Dr. A. H. DOTY:

Dear Doctor.—The garbage of this city is collected and disposed of by Columbus Sanitary Company.

Garbage is destroyed by reduction process, "Detroit" system. Ashes and garbage are separated. The method is satisfactory.

Yours truly,
W. D. DEUSCHLE,
Superintendent.

STATE BOARD OF HEALTH,
PHILADELPHIA, PA., *January* 26, 1900.

Dr. ALVAH H. DOTY, *Quarantine Officer, Port of New York, N. Y.:*

My Dear Doctor.—Replying to your note of inquiry with regard to the disposal of the garbage of this city, I would state that the work is done by contract; the contract price for the present year being $398,000. This amount pays for the collection and disposal of kitchen garbage and dead animals throughout the entire city. The collections are made daily except Sunday. The material is supposed to be all disposed of by reduction on the plan known as the "Arnold System Improved." The product is grease and fertilizer and a small amount of fuel. From the fact that the State Board of Health occasionally, although not as frequently as formerly, receives complaints of the deposits of garbage on farms and at piggeries outside of the city limits, I conclude that a certain amount, but probably not a very large amount, escapes the reduction plant.

Yours very truly,
BENJAMIN LEE, M. D.,
Secretary.

DEPARTMENT OF HEALTH,

BUFFALO, N. Y., *January* 5, 1900.

A. H. DOTY, M. D., *Quarantine, Staten Island:*

Dear Doctor.—In reply to your letter of inquiry concerning garbage disposal in this city, I have to state that the yearly accumulation represents some 28,000 tons, which is collected and disposed of by contract under the supervision of the board of public works, at a cost to the city of about $80,900. Garbage and ashes are differentiated and collected on an average from once daily to twice a week, depending on the season, also section of the city. Collections are made in specially constructed wagons to prevent dripping, and the material and wagons disinfected.

The Buffalo Garbage Reduction Company are the final recipients to reduce the material for commercial purposes.

Under the present system and as a result of State Board of Health inspection at the plant, no nuisance is created and we have had no complaints for a long time.

In the opinion of the writer the most desirable way of garbage disposal where practical is by household cremation or carbonizing—a method which at present does not appear practical, but will undoubtedly come in the future.

Municipal disposition is best attained by sanitary collection and final disposal by the reduction system which is now an established utilitarian factor. The material is so valuable that the reduction company should receive no compensation for collecting and disposing of it, where there is over 25,000 tons per year. Whatever system is adopted, the entire process from household to plant should be absolutely under municipal control to insure sanitation, system and efficiency.

The details of the various processes are well known to you, so it will be needless for me to refer to that feature.

I am, doctor,

Yours very truly,

ERNEST WENDE,

Health Commissioner.

Board of Sanitary Commissioners,

Savannah, Ga., *January* 25, 1900.

Dr. A. H. Doty, *Health Officer, New York:*

Dear Doctor Doty.—Your letter of January 23 on the subject of garbage disposal has just been received.

Savannah has nothing to boast of in the matter of garbage disposal. For years the garbage has been collected during the day time and placed anywhere outside of the city limits and persons living near the garbage dumps have entered strong and reasonable objections to such deposits being made. About ten years ago I tried to institute two reforms: First. The removal of garbage during the night time in an enclosed odorless wagon; and, second, the erection of a crematory. I succeeded in getting the crematory, which for a short time did its work in a satisfactory manner. It soon became incapable of doing the work, due in my opinion to two causes; namely, faulty construction and mismanagement. At the present time we remove garbage during the day time in open carts and deposit it at points a distance less than two miles from the city limits. We are constantly having complaints from people living near these garbage dumps and we are continually shifting our places of deposit every month or so. In the year 1898 it cost the city of Savannah $24,486.47 for this work and the receipts from all sources were $229. It is contemplated in the near future to run specially prepared cars on one of our railways for garbage and to have it deposited about seven miles from the city at points well removed from habitation.

I am very much afraid that this information will be of little service to you.

Very truly yours,

W. F. BRUNNER, M. D.,
Health Officer.

DEPARTMENT OF HEALTH,

ST. PAUL, MINN., *January* 24, 1900.

A. H. DOTY, M. D., *Health Officer, Port of New York:*

Dear Sir.—Yours of January 22 at hand. In reply will say the collection and disposition of garbage and dead animals has heretofore been given out to contractors. The city is divided into 11 wards or districts. Bids have been received by the common council on each of the eleven districts and the lowest bidder usually awarded the contract. New contracts are let each year.

At present the question is pending before the council on account of complaint made by myself of the unsatisfactory method of the contract system. It has not yet been decided whether the contract system is to continue or if the work should be under the direct control and supervision of the health department, that is to say, allow the health commissioner a certain amount to hire men and teams to collect garbage. The specifications this year call for the removal of rubbish as well as garbage. Ashes are not collected by the city, neither is rubbish. I am trying to introduce the collection of rubbish with garbage. We have no crematory. The garbage is collected in air tight barrels or boxes and disposed of outside of the city limits mostly to farmers for fertilizing purposes, etc.

Hoping I have answered all your questions, I am,

Yours truly,

J. OHAGE, M. D.,

Commissioner of Health.

BUREAU OF HEALTH,

PITTSBURG, PA., *January* 23, 1900.

DR. A. H. DOTY, *Health Officer, Port of New York:*

Dear Sir.—Replying to your letter of inquiry of the 16th, I beg to say that the garbage and dead animals of this city are collected, removed and disposed of under contract. The cost being $93,890 per annum.

The method of disposal is that known as the " Flinn Reduction System," which I believe is a modification of and improvement on that of the American Reduction Company. It has been in operation here for the past four years and during the past two years or more has been satisfactory. The product is used as a fertilizer. The ashes are separated from the garbage, as in our opinion they should be and used in the filling of low grounds, etc.

They are not collected and removed at the public expense, but by private parties at the cost of the householder.

Trusting that this reply, though brief, may be of service to you, I am,

Yours very truly,

CROSBY GRAY,

Superintendent.

New York, *January* 15, 1900.

Dr. A. H. Doty, *Health Officer, Quarantine, S. I.:*

My Dear Sir.—Referring to our conversation about the relative merits of the various methods for disposing of garbage and your request that I should put in writing my experience and views on the subject, I beg to say that I had charge of the work of collecting and disposing of garbage and house sweepings in the city of New Orleans for over two years, and that I am strongly of the opinion that the most economical and most sanitary method of getting rid of all such material is by cremation.

After securing the contract from the city of New Orleans, the parties investigated very thoroughly the different methods advocated for disposing of garbage proper, which was understood to mean kitchen refuse, consisting of animal and vegetable matter from markets, etc., as distinguished from waste paper, rags, house sweepings and other similar material not subject to immediate decomposition.

Various utilization processes were examined, as likewise different systems for cremation and the advantages sanitary and commercial of the utilization processes were so alluringly set forth that the contractor finally erected a large plant to operate what is known as the " Simonian System," by which the moisture and greases are extracted from the garbage by the use of naphtha and the solid residue converted into fertilizer.

An essential feature of this and other processes is that householders should keep garbage proper separate from house sweepings, etc., and this of course entailed a double service for collection. It was found in practice to be impossible to get the citizens to keep the different material separate and a great deal of trouble and expense resulted therefrom and at the same time a great many unsanitary results from mixing of the two classes of material. For instance, if rags, paper, and such articles were found in what was collected as garbage, it was necessary to sort them out before applying the naphtha and naturally they were more or less contaminated and offensive. The house sweepings, paper, ashes, etc., that were not offensive, if kept separate from the garbage, were dumped at convenient spots to serve as filling, but it was found in practice that a great deal of material of an offensive character, deleterious from a sanitary standpoint, came mixed up with these sweepings and rendered the dumps dangerous to health.

After operating the utilization plant for about 18 months, the sanitary objections, to say nothing of the increased expense, were so great on account of the mixture of offensive and non-offensive material that we were obliged to erect crematories and abandon the utilization process and destroy everything by burning.

We found this method of disposing of the refuse very much cheaper and more satisfactory in every way. If loads of supposed sweepings were found to be mixed up with offensive matter, they were at once sent to the crematory and everything was destroyed. If paper, rags, etc., were found mixed with the garbage proper, there was no necessity for any sorting out before the garbage could be disposed of, but everything was dumped into the crematory as received by the collection wagon. Nothing more was seen or heard of it until it was withdrawn in the shape of inocuous ashes.

In all utilization processes, there is a large amount of offensive drainage that must be disposed of in liquid form, either before or after treatment, whereas in properly constructed cermatories this passes off unperceived in the shape of vapor. All gases from crematories can be rendered absolutely inoffensive and the work of destruction can be carried on without causing any nuisance even in a thickly populated district.

I am clearly of the opinion that a properly constructed crematory is without question the best means of disposing of the garbage of a great city.

Yours truly,

T. A. CLAYTON.

Office of Chilton Thorington, City Physician,

Montgomery, Ala., *February* 9, 1900.

A. H. Doty., Esq., *Health Officer, Port of New York, N. Y.:*

Dear Sir.—In reply to attached communication, I beg to say that our method of disposing of garbage is of a very primitive kind and is not entirely satisfactory to the health department. The trash is carried by wagons to " washouts and gullies " outside the city limits, dumped on the level ground and there carefully assorted. All vegetable and animal matter are carried from thence to a great distance and buried at a good depth; while old rags, paper, etc., are burned. The dry trash is then used to fill up the aforementioned gullies and washouts. No manure is collected by the garbage cart, but individuals must dispose of it to farmers or others, as no large collection is allowed in any yard or stable. Dead animals of the horse and cow kind are placed in a rendering tank and made into fertilizer. Slops are emptied into slop-hoppers or kitchen sinks, which are connected with the sanitary sewer, and, like the closets, find the way to running water.

Respectfully,

CHILTON THORINGTON,

City Physician.

HEALTH DEPARTMENT,
BANGOR, ME., *January* 24, 1900.

A. H. DOTY, M. D., *Health Officer, Port of New York:*

Dear Sir.—We dispose of our garbage at present by having it hauled away by teams from the country, which is not satisfactory. We expect in the spring to have some better method of disposing of our garbage. Do not know what it will be yet.

Yours truly,
JOHN GOLDTHWAIT, M. D.,
Secretary Board of Health.

OFFICE OF COMMISSIONER OF HEALTH,
MINNEAPOLIS, MINN., *January* 10, 1900.

A. H. DOTY, M. D., *Health Officer, Port of New York:*

Dear Doctor.—I beg to thank you in advance in the matter of our Hamburg crematory.

At the present time our garbage is collected under the contract system, and our experience has been that of all other cities which operate under that method, most unsatisfactory. The garbage is hauled by the contractor's wagons to a convenient point, where it is transferred to farmers who desire the stuff to feed to hogs. What is unsuitable for feeding purposes is hauled to the country by the contractor and buried under from four to six inches of soil. As I stated before, however, the system is a most unsatisfactory method of disposal.

My annual report will be ready in the course of a week and I will send you a copy. In it I have compiled statistics from many of the principal European cities dealing with various methods of collecting and disposing of the waste of the city.

Very truly yours,
A. K. NORTON, M. D.,
Commissioner of Health.

Office of Sanitary Inspector,
Austin, Texas, *January* 28, 1900.

A. H. Doty, M. D., *Health Officer, Port of New York:*

Dear Sir.—In reply to yours of the 22d, will say that we do not cremate our garbage, but think that it would be best to do so. We just dump ours on the river beach and it washes away when the river rises; but it is not satisfactory by any means.

Truly yours,
R. D. BELL,
Sanitary Inspector.

Brooklyn, N. Y., *December* 26, 1899.

A. H. Doty, M. D., *Port Physician of New York:*

Dear Sir.—I read with much interest your views on the disposal of city garbage in some European cities.

The proper disposal of garbage in this metropolitan district is a growing question here. For fifteen years that I was engaged, nine of which was at Barren Island on the very spot where the garbage plant is now, in the rendering of Menhaden fish for oil and drying of fish scrap which is now universally done and which has almost replaced Peruvian guano. I made many attempts to utilize garbage, satisfying me that the only way this material can be done away with is either to burn it, or largely mixed with ashes and earth use it to fill up low lands, same as I disposed of it in New Orleans, when deputy street commissioner in charge of the French part of the city, then under Federal control, and here in Brooklyn under Health Commissioner Otterson, permission was allowed Leary's ship yard to be so filled as well as the Ambrose large tracts in South Brooklyn skirting the bay. All these large tracts were filled up with this refuse mixed up with ashes, top dressed with earth without the slightest danger to the public health, making a very solid filling; as the alkali of the ash soon destroys the vegetable part of the garbage and saponifies the greese, seeming to harden the mass.

With great economy to the city, like quantities could yet be so used, especially on the salt meadows between Bensonhurst and Coney Island, also along the meadows of Newtown creek, Flushing Bay and other like places easily reached by water.

I have not yet seen any garbage furnaces, or process in this country that has proven practical mechanically or commercially successful. While my observation of garbage collection in London and Paris contained much less moisture than ours and this excess means more fuel to consume it, as it is a mathematical problem that one pound of coal can evaporate only just so much water, I am of your opinion that people should as far as possible consume their garbage, but in summer time, when the quantities are much greater, most of our housekeepers either use kerosene or gas stoves to do their cooking with.

My experience leads me to the belief that the only way to solve this question practically and economically is for this municipality to erect crematories as you suggest and utilize the surplus as I have indicated, thus removing what could not be readily cremated at the expense of those who wish to use it under the special supervision of the health inspectors whose time would be paid by them to the Department.

All of which is respectfully submitted as it might embody some useful suggestions and data.

Respectfully yours,

LOUIS C. D'HOMERGUE.

DEPARTMENT OF HEALTH,

SAN FRANCISCO, CAL., *February* 19, 1900.

A. H. DOTY, M. D., *Health Officer, Port of New York:*

Dear Sir.—It is my individual opinion as well as the Board of Health already expressed to you in a recent letter from the president of the Board that incineration of garbage in this city is eminently successful, and furthermore, is the only sanitary method of disposing of waste. The only opponents of the system in San Francisco are a few neighbors who object to smoke and scavengers, who are dissatified with tariff by reduction work.

Respectfully,

A. P. O'BRIEN,
Health Officer.

REPORT

OF THE

COMMISSIONERS

OF

Watkins Glen Reservation.

TRANSMITTED TO THE LEGISLATURE, MARCH 7, 1900.

ALBANY:
JAMES B. LYON, STATE PRINTER.
1900.

STATE OF NEW YORK.

No. 68.

IN ASSEMBLY,

March 7, 1900.

REPORT

OF THE

Commissioners of Watkins Glen Reservation.

Watkins, N. Y., *March* 3, 1900.

To the Legislature of the State of New York:

The Watkins Glen Reservation Commission organized on June 22, 1899, in compliance with the provisions of act, chapter 683 of the Laws of 1899, and at a subsequent meeting, by resolution, after a careful and detailed examination, selected and located the following tracts or parcels of land, for the purposes prescribed in said act.

The parcels or tracts of land, so selected and located, are shown on a map made by the State Engineer and Surveyor and now on file in the office of the Secretary of State, and in the office of the clerk of Schuyler county.

Parcel No. 1.—Watkins Glen and lands connected therewith and forming a part thereof, containing 103.359 acres of land and owned by Caroline C. Buttner-Shiverick.

Parcel No. 2.—Lands of Angelica C. Beach and Daniel Beach, lying on the north side of Watkins Glen, containing 21.072 acres.

Parcel No. 3.—Lands of Margaret McCreery, lying on the north side of Watkins Glen, west of the Beach lands above mentioned, and east of the lands of the Syracuse, Geneva and Corning Railway Company, leased by the New York Central and Hudson River Railroad Company, containing 2.77 acres.

Parcel No. 4.—Lands of Mary E. White, lying at the head of Watkins Glen and west of the Glen property, owned by C. C. Buttner-Shiverick, and containing 5.87 acres.

Parcel No. 5.—Lands of Margaret Roberts, on the south side of Watkins Glen, and containing 10.15 acres.

Parcel No. 6.—Lands of Henry H. Van Meter, on the Corning road, in the village of Watkins, on the south side of said Watkins Glen, containing 7.887 acres.

Parcel No. 7.—Lands of Charlotte Roe, being a house and lot on the south side of said Glen property and on the west side of Corning street, in the village of Watkins, containing .365 of an acre.

Parcel No. 8.—Lands of John M. Roe, in the village of Watkins, on the west side of Corning street, known as the Sand-pit lot, and containing .471 of an acre.

Parcel No. 9.—Lands of Azubah A. Bohlmers, on the south side of said Glen property, and west of the lands of said Margaret Roberts, containing 2.63 acres.

Parcel No. 10.—Lands of William E. Berry and Minnie Berry, his wife, being a house and lot in the village of Watkins, bounded west by the lands of said Henry H. Van Meter, containing .629 of an acre.

Eight of the above described parcels of land, so selected and located, can be purchased from the respective parties or owners, contracts for which have been made and delivered, and are herewith submitted, for the following amounts:

Parcel No. 1.—Belonging to Caroline C. Buttner-Shiverick, known as the Watkins Glen and lands connected therewith and forming a part of the Watkins Glen property, including the personal property and furniture in the Glen Mountain House, and other buildings on said premises, can be purchased and conveyed to the State and a good clear title given for the sum of eighty-five thousand dollars ($85,000).

Parcel No. 2.—Belonging to Angelica C. Beach and Daniel Beach, her husband, can be purchased and conveyed to the State and a good clear title given for the sum of one thousand and eighty dollars ($1,080).

Parcel No. 3.—Belonging to Margaret McCreery, can be purchased and conveyed to the State and a good clear title given for the sum of four hundred dollars ($400).

Parcel No. 4.—Belonging to Mary E. White, can be purchased and conveyed to the State and a good clear title given for the sum of two hundred and ninety-three dollars and fifty cents ($293.50).

Parcel No. 5.—Belonging to Margaret Roberts, can be purchased and conveyed to the State and a good clear title given for the sum of one thousand and fifteen dollars ($1,015).

Parcel No. 7.—Belonging to Charlotte Roe, can be purchased and conveyed to the State and a good clear title given for the sum of eight hundred dollars ($800).

Parcel No. 8.—Belonging to John M. Roe, and known as the

Sand-pit lot, can be purchased and conveyed to the State and a good clear title given for the sum of one hundred dollars ($100).

Parcel No. 10.—Belonging to William E. Berry and Minnie Berry, can be purchased and conveyed to the State and a good clear title given for the sum of two thousand dollars ($2,000).

The Commissioners have been unable to obtain a contract for the purchase of either parcel No. 6 or parcel No. 9, owned by Azubah A. Bohlmers and Henry H. Van Meter, respectively.

In addition to the tracings of each parcel attached to the several contracts, a copy of the official map of the lands located by the Commissioners is also herewith submitted.

Watkins Glen has as distinct an individuality as Niagara Falls, or the Mammoth Cave, for like those world-famed natural wonders, it presents the most varied, the most charming and interesting that is known in glen scenery, and has attracted thousands of visitors from all sections of our own country, as well as from foreign lands.

It is because it is everywhere recognized as the most wonderful and attractive spot of its kind that the State is asked to preserve it for public inspection and pleasure and make it a State park and reservation, free of access not only to the people of our own State, but also to the visitors from other commonwealths and foreign countries.

With the recommendation that the Watkins Glen Reservation be established, and the lands purchased in conformity to the plans and on the terms herein provided, the Commission respectfully submits this report.

WILLIAM H. WAIT,
JOHN A. CLUTE,
JONAS S. VANDUZER,
JAS. B. RATHBONE,
WM. B. OSBORNE,
The Commissioners of Watkins Glen Reservation.

[Copy.]

AN AGREEMENT

Made this 23d day of February, in the year of our Lord one thousand nine hundred, between C. C. Buttner Shiverick, Watkins, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York, known as, 1st, The Glen; 2nd, The Ackley Lot; 3rd, The Pavilion Lot; 4th, The Cemetery Lot; 5th, The Sand-Pit Lot; 6th, The McCreery Lot.

1st. THE "GLEN."

Being the premises conveyed by deed dated September 28th, 1865, by George G. Freer and wife to Matthew D. Freer and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 18, page 228.

2nd. THE "ACKLEY LOT."

Being the premises conveyed by deed dated January 23, 1873, by Anson N. Ackley and wife to Eli B. Parsons and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 20, page 447.

Both of the aforesaid connected tracts of land being bounded as follows: On the north by the lands of Mrs. Eunice Latin, Morris Richardson, Horace L. Prentice, New York Central and Hudson River Railroad Co., Lessee, Margaret McCreery, Angelica C. Beach, the Catholic Cemetery Association, the Glenwood Cemetery Association, the lands of the party of the first part, known as the "Pavilion Lot" and Tenth street; on the east by Madison street, Franklin street and the lands of Henry H. VanMeter; on the south by the lands of Charlotte Roe, Henry H. VanMeter, the Gibbs estate, Azubah A. Bohlmers, Wm. Roberts, the Pike estate, the easterly portion of the Mills estate, the lands of Jacob Mills, Vine Mills and Henry C. Hall; on the west by the lands of Ira White known as the "Saw-Mill Lot," containing about 100.375 acres.

3rd. THE "PAVILION LOT."

Beginning at a point at the intersection of the southerly side of Pine street and the westerly side of Madison street, as said streets are described in Ordinance No. 42, adopted on January 18, 1875, by the trustees of the village of Watkins; thence S 14° .07′ E 419.6 feet along the westerly line of said Madison street to a stake; thence S 69° 12′ W 244.4 feet to a stake; thence N 81° 18′ W 136.5 feet to a stake; thence S 88° 48′ E 68 feet to a stake; thence N 84° 12′ E 79.2 feet to a stake; thence N 32° 12′ E 320.1 feet to a stake; thence N 58° 23′ W 489.5 feet to the east line of Jackson street; thence along the east line of Jackson street N 19° 50′ W 140 feet to a stake; thence N 14° .07′ W 45.5 feet along said east line of Jackson street; thence N 53° 51′ E 22.5 feet to a stake in the southerly line of Pine street; thence S 58° 14′ E 472.2 feet along said southerly line to the place of beginning and containing about 2.223 acres.

Being bounded on the north by Pine street; on the east by Jackson street; on the south by The Glen; and on the west by Glenwood Cemetery and Jackson street.

Being the same premises conveyed by deed dated November 22, 1878, by Josiah D. Payne and Elizabeth H. Freer as executors of George G. Freer to John J. Lyttle and Thomas Lippincott and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 27, page 135.

4th. THE "CEMETERY LOT."

Beginning at a stake and stones at station No. 75 of the line known as the Arbitration Line; thence N 49° 51′ E 157.7 feet to an oak tree, Station No. 76 of said Arbitration Line; thence N 71° 17′ E 74.6 feet to a stake and stones, Station No. 77 of said

Arbitration Line; thence N 28° .05′ E 130.8 feet to a red pine tree, Station No. 78 of said Arbitration Line; thence S 43° 30′ W 192.1 feet to an oak tree, being said Station No. 76 of said Arbitration Line; thence S 60° 28′ W 205.2 feet to a stake on the said Arbitration Line; thence S 88° 12′ E 58 feet to the place of beginning, containing about .145 acres.

Being bounded on the north and west by Glenwood Cemetery and on the south and east by the Glen.

Being the same premises conveyed by deed dated December 13, 1873, by George G. Freer and Elizabeth H. Freer to John J. Lyttle and Anna De B. Michener and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 22, page 184.

5th. THE "SAND-PIT LOT."

Beginning at a stake in the west line of Corning road at the northeast corner of the lot owned by John M. Roe; thence S 76° 56′ W 124 feet to a stake; thence N 15° 35′ W 74.6 feet to a stake; thence N 76° 56′ E 96 feet to a stake; thence 28° 18′ E 30 feet to a stake; thence N 76° 56′ E 25.3 feet to a stake in the west line of said Corning road; thence S 10° 39′ E 45.1 feet along said west line to the place of beginning, containing about .197 acre.

Being bounded on the north by lands of Henry H. VanMeter; on the east by the Corning road; and on the south and west by lands of John M. Roe.

Being the same premises conveyed by deed dated September 17, 1898, by John M. Roe and wife to C. C. Buttner and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 46, page 518.

6th. THE "McCREERY LOT."

Beginning at a pine stump at Station No. 45 of the line known as the Arbitration Line; thence on the following courses and bearings as said line was originally surveyed, to wit: S 2° 40′ W 1.73 chains to a pine tree No. 46; thence S 29° W 2.45 chains to a pine tree No. 47; thence S 42° E 1.03 chains to a stake; thence N 62° E 1.10 chains to a pine tree; thence N 56° 15′ E .22 chains to a point at the intersection of the said Arbitration Line with the westerly line of the right of way of the New York Central and Hudson River Railroad Company, Lessee; thence along said westerly line N 2° .09′ E 3.99 chains to the place of beginning containing about .419 acre.

Being bounded on the north, west and south by the Glen and on the east by the right of way of the New York Central and Hudson River Railroad Company, Lessee.

Being the same premises conveyed by deed dated October 16, 1877, by Daniel Beach and Angelica Beach to John J. Lyttle, Amos J. Michener and Thomas Lippincott and recorded in the office of the county clerk of Schuyler county in Book of Deeds No. 22, page 500.

All of the aforesaid six tracts of land being as shown and described on a map of Watkins Glen and adjoining lands made under the direction of the State Engineer and Surveyor and filed by the commissioners of Watkins Glen Reservation in the office of the Secretary of the State of New York and in the office of the clerk of Schuyler county pursuant to chapter 683 of the Laws of 1899, and being the same lands conveyed by deed dated April 30, 1897, by Edward R. Longstreth to Caroline C. Buttner, the party of the first part, and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 47, page 98, etc., except the 5th tract of land (the said Sand-Pit Lot) conveyed by deed dated September 17, 1898, by John M. Roe to Caroline C. Buttner, the party of the first part.

Excepting, however, from the aforesaid lands conveyed by Geo. G. Freer and wife to Matthew G. Freer, all of that piece or parcel of land conveyed for railroad purposes only by deed dated August 8, 1883, by Amos J. Michener and wife to The Syracuse, Geneva and Corning Railway Company and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 33, page 240.

The party of the first part for the consideration aforesaid agrees to include in the sale of said real property, all the furniture and personal property in the Glen Mountain House and other buildings on said premises which now belong to her, and she agrees to sell and convey the same to the party of the second part at the time she may be required by this contract to convey the said real property as herein provided.

Now, Therefore, the said party of the first part, in consideration of the sum of one dollar to her in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to her of the sum of $85,000 to be paid as hereinafter stated; provided said sum of $85,000 be appropriated by the Legislature of said State for the purpose of paying said party of the first part, for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part, of said sum of $85,000 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

In witness whereof the said party of the first part has hereunto set her hand and seal the day and year first above mentioned.

STATE OF NEW YORK, } *ss.:*
COUNTY OF }

On this 23rd day of February, in the year one thousand nine hundred, before me personally appeared .... to me known to be the same person who executed the foregoing instrument and acknowledge that she executed the same.

[Copy.]

AN AGREEMENT

Made this 28th day of February, in the year of our Lord one thousand nine hundred, between Daniel Beach and his wife, Angelica C. Beach, of the town of Reading, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at a stake in the northern boundary of Watkins Glen, in the line known as the "Arbitration Line," and forming the corner of lands of Margaret McCreery, C. C. B. Shiverick and the party of the first part; thence along the said Arbitration Line for the following nineteen courses as said line is described on pages 566 to 571 of Liber 1 of Miscellaneous Records in the office of the county clerk of Schuyler county to wit:

S 83° 40′ E .51 chains to a chestnut tree No. 52.

Thence N 83° E 1.17 chains to a pine tree No. 53.

Thence N 39° E 1.33 chains to a pine tree No. 54.

Thence N 61° 50′ E 1.47 chains to an oak tree No. 55.

Thence N 49° 40′ E 1.18 chains to an oak tree No. 56.

Thence N 78° 30′ E 2.95 chains to an oak tree No. 57.

Thence S 82° 45′ E 1.37 chains to a pine tree No. 58.

Thence S 81° E 3.12 chains to a pine tree No. 59.

Thence S 71° E 3.57 chains to a pine tree No. 60.

Thence S 81° 30′ E 4.08 chains to a pine tree No. 61.

Thence N 88° 45′ E 1.43 chains to a pine tree No. 62.

Thence N 59° E 1.55 chains to an oak tree No. 63.

Thence N 67° 45′ E 2.93 chains to an oak tree No. 64.

Thence N 80° 10′ E 4.06 chains to a pine tree No. 65.

Thence S 77° 40′ E 2.63 chains to a pine tree No. 66.

Thence N 86° 15′ E 1.64 chains to a pine tree No. 67.

Thence N 48° 40′ E 1.35 chains to a pine tree No. 68.

Thence N 44° E 2.32 chains to a pine tree No. 69.

Thence N 61° 40′ E .55 chains to a stake in the "Arbitration Line" forming the corner of lands of C. C. B. Shiverick, the

Catholic Cemetery and the party of the first part; thence (as shown on the attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900), N 5° .25′ E 315 feet to a stake and stones; thence S 84° .08′ W 2,389.1 feet to a stake and stones; thence S 7° .50′ W 395.8 feet to the place of beginning and containing about 21.072 acres; without prejudice however against the parties of the first part for any claim of any party or parties heretofore, now or hereafter owning or claiming any of said Glen property.

Being bounded on the north by the lands of the parties of the first part; the northerly boundary line of the premises intended herein to be conveyed, being a line which begins at a stake and stones on the easterly line of the lands of Margaret McCreery, distant on said easterly line 395.8 feet from the southeast corner of the lands of said Margaret McCreery, cornering on the lands of C. C. B. Shiverick on what is known as the "Arbitration Line," hereinbefore mentioned, and running thence north 84° .08′ E 2,389.1 feet to a stake and stones; on the east by the Catholic Cemetery; on the south by lands of C. C. B. Shiverick and on the west by lands of Margaret McCreery.

Being part of the premises conveyed November 18, 1889, by Irving W. Cole, referee, to Angelica C. Beach, recorded in the office of the clerk of Schuyler county in Book of Deeds No. 37, page 522.

And it is hereby mutually understood and agreed that the deed of conveyance herein contemplated shall contain a condition wherein the party of the second part shall agree to build and maintain a good and sufficient division fence on the northerly line of the lands herein intended to be conveyed without cost or expense to the parties of the first part, their heirs, successors and assigns.

The hereinbefore mentioned plat of survey made under the direction of the State Engineer and Surveyor is a copy of a portion of the map filed in the office of the Secretary of the State of New York and in the office of the clerk of Schuyler county by the commissioners of Watkins Glen Reservation pursuant to chapter 683 of the Laws of 1899.

Now, Therefore, the said party of the first part, in consideration of the sum of one dollar to her in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to them of the sum of $1,080 to be paid as hereinafter stated; provided said sum of $1,080 be appropriated by the Legislature of said State for the purpose of paying said party of the first part, for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part of said sum of $1,080 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

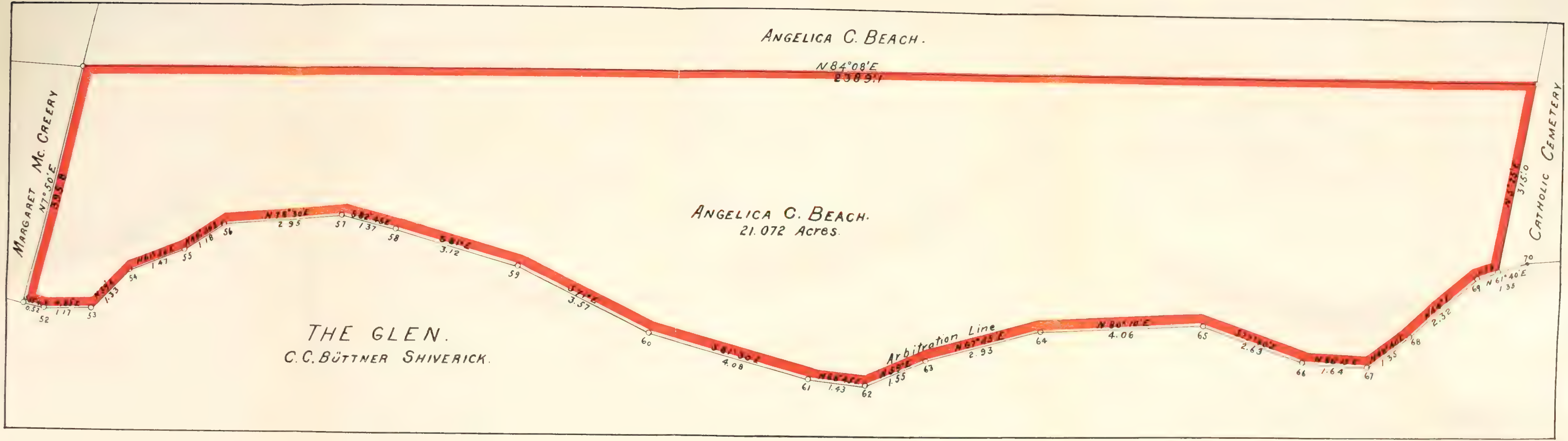
In witness whereof the said party of the first part has hereunto set their hands and seals the day and year first above mentioned.

DANIEL BEACH,
ANGELICA C. BEACH.

STATE OF NEW YORK,
COUNTY OF SCHUYLER, } *ss.:*

On this 28th day of February, in the year one thousand nine hundred, before me personally appeared Daniel Beach and Angelica C. Beach, to me known to be the same persons who executed the foregoing instrument and acknowledged that they executed the same.

FRANK W. FIERO,
Notary Public.



MAP OF LANDS OF ANGELICA C. BEACH.
Surveyed, Jan. 1900.
Scale, 132ft = 1in.

[Copy.]

AN AGREEMENT

Made this 21st day of February, in the year of our Lord one thousand nine hundred, between Margaret McCreery, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at a pine tree, No. 50, in the northern boundary of Watkins Glen (boundary being known as the " Arbitration Line " and described and recorded in the office of the clerk of Schuyler county in Book of Miscellaneous Records, pages 566 to 571) and forming the corner of lands owned by the New York Central and Hudson River Railroad Company, Lessee, C. C. B. Shiverick and the party of the first part; thence N 6° 51′ W 360.5 feet to a stake; thence N 88° 25′ E 373.65 feet to a stake; thence S 7° 50′ W 395.8 feet to a stake in the Arbitration Line; thence S 81° 51′ E 153.1 feet to a stake; thence S 89° 11′ E 125.56 feet to the place of beginning and containing about 2.77 acres.

Being bounded on the north by lands of the party of the first part; on the east by lands of Angelica C. Beach; on the south by lands of C. C. B. Shiverick; and on the west by lands of the New York Central and Hudson River Railroad Company, Lessee; all as shown on attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900.

Being part of the premises bequeathed by John McCreery to his wife Margaret McCreery, July 6, 1888, and recorded in the office of the clerk of Schuyler county in Book of Wills No. 11, page 7.

The hereinbefore mentioned plat of survey made under the direction of the State Engineer and Surveyor is a copy of a portion of the map filed in the office of the Secretary of the State of New York and in the office of the clerk of Schuyler county by the commissioners of Watkins Glen Reservation pursuant to chapter 683 of the Laws of 1899.

NOW, THEREFORE, the said party of the first part, in consideration of the sum of one dollar to her in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to her of the sum of $400 to be paid as hereinafter stated; provided said sum of $400 be appropriated by the Legislature of said State for the purpose of paying said party of the first part, for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part of said sum of $400 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

In witness whereof the said party of the first part has hereunto set her hand and seal the day and year first above mentioned.

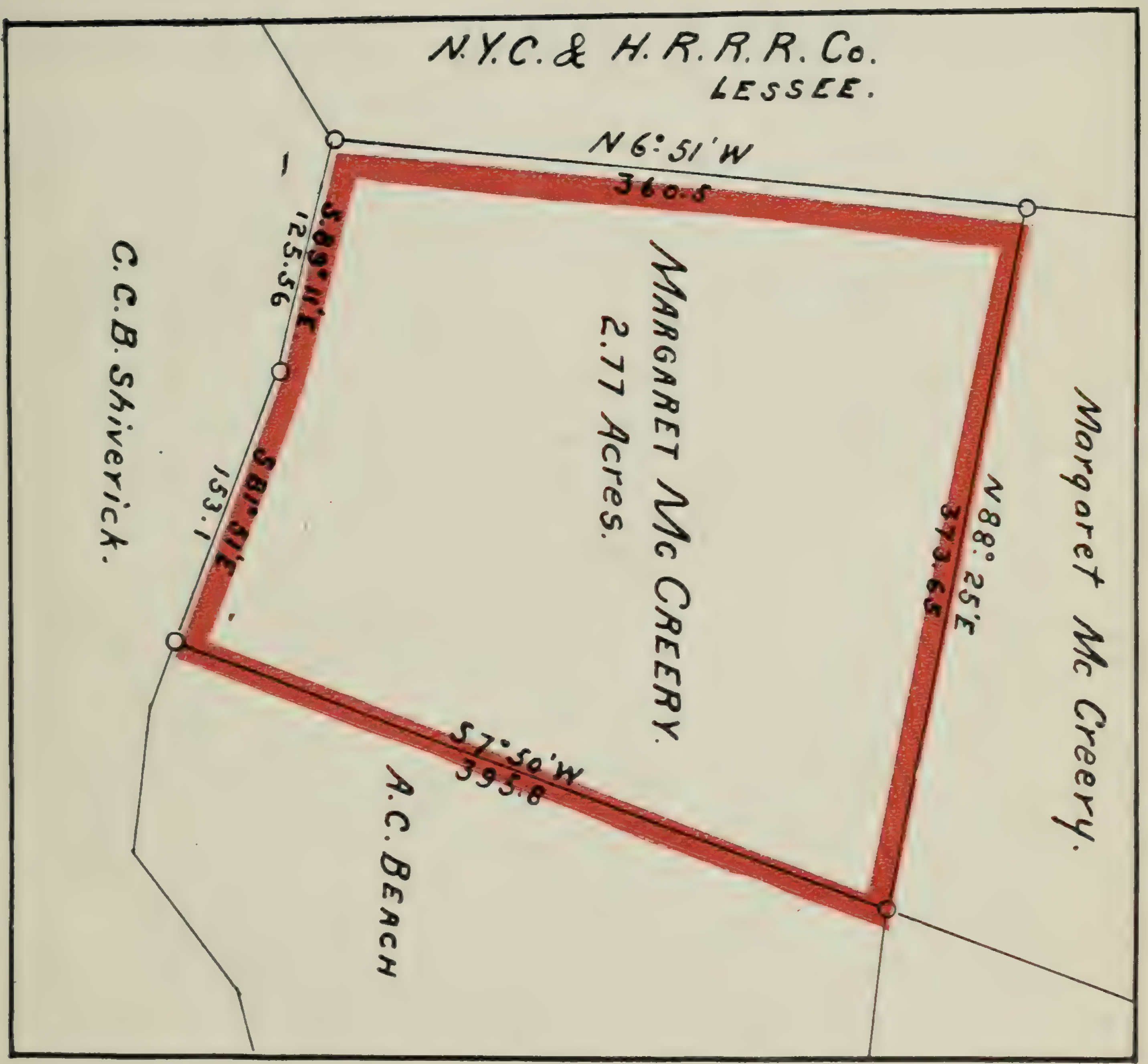
her
MARGARET X McCREERY.
mark

Witness
MARY McCREERY.

STATE OF NEW YORK, } *ss.:*
COUNTY OF SCHUYLER, }

On this 21st day of February, in the year one thousand nine hundred, before me personally appeared Margaret McCreery, to me known to be the same person who executed the foregoing instrument and acknowledged that she executed the same.

P. H. HAWES,
Notary Public.



MAP OF LANDS OF MARGARET McCREERY.

Surveyed Jan. 1900.

Scale, 132'=1".

[Copy.]

AN AGREEMENT

Made this 23rd day of February, in the year of our Lord one thousand nine hundred, between Mary E. White, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at a stake and stones in the section line forming the corner of lands of Henry C. Hall, the heirs of Rachel Gilbert, C. C. B. Shiverick and the party of the first part; thence N 47° 30′ W 220.8 feet to a stake; thence N 2° W 83.8 feet to a stake; thence S 88° .02′ W 129.3 feet to a stake; thence S 54° 17′ W 91.8 feet to a stake; thence S 56° 44′ W 257.4 feet to a stake; thence N 5° 51′ E 599 feet to a point in the centre of the highway; thence S 80° 49′ E 70.2 feet to a point in the center of said highway; thence S 71° 18′ E 126.1 feet to a point in the center of said highway; thence S 89° 22′ E 212.6 feet to a point in the center of said highway; thence S 75° 18′ E 189.7 feet to a point in the center of said highway; thence S 6° 43′ W 531.2 feet along the aforesaid section line and westerly boundary of Watkins Glen to the place of beginning and containing about 5.87 acres.

Being bounded on the north and west by lands of party of the first part; on the east by lands of C. C. B. Shiverick and others; and on the south by the lands of the heirs of Rachel Gilbert, all as shown on attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900.

Being part of the premises conveyed by deed dated April 1, 1879, by Lazette White to Ira White and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 29, page 461.

The hereinbefore mentioned plat of survey made under the direction of the State Engineer and Surveyor is a copy of a portion of the map filed in the office of the Secretary of the State of New York and in the office of the clerk of Schuyler county by the commissioners of Watkins Glen Reservation pursuant to chapter 683 of the Laws of 1899.

Now, Therefore, the said party of the first part, in consideration of the sum of one dollar to her in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to her of the sum of $293.50 to be paid as hereinafter stated; provided said sum of $293.50 be appropriated by the Legislature of said State for the purpose of paying said party of the first part, for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part of said sum of $293.50 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

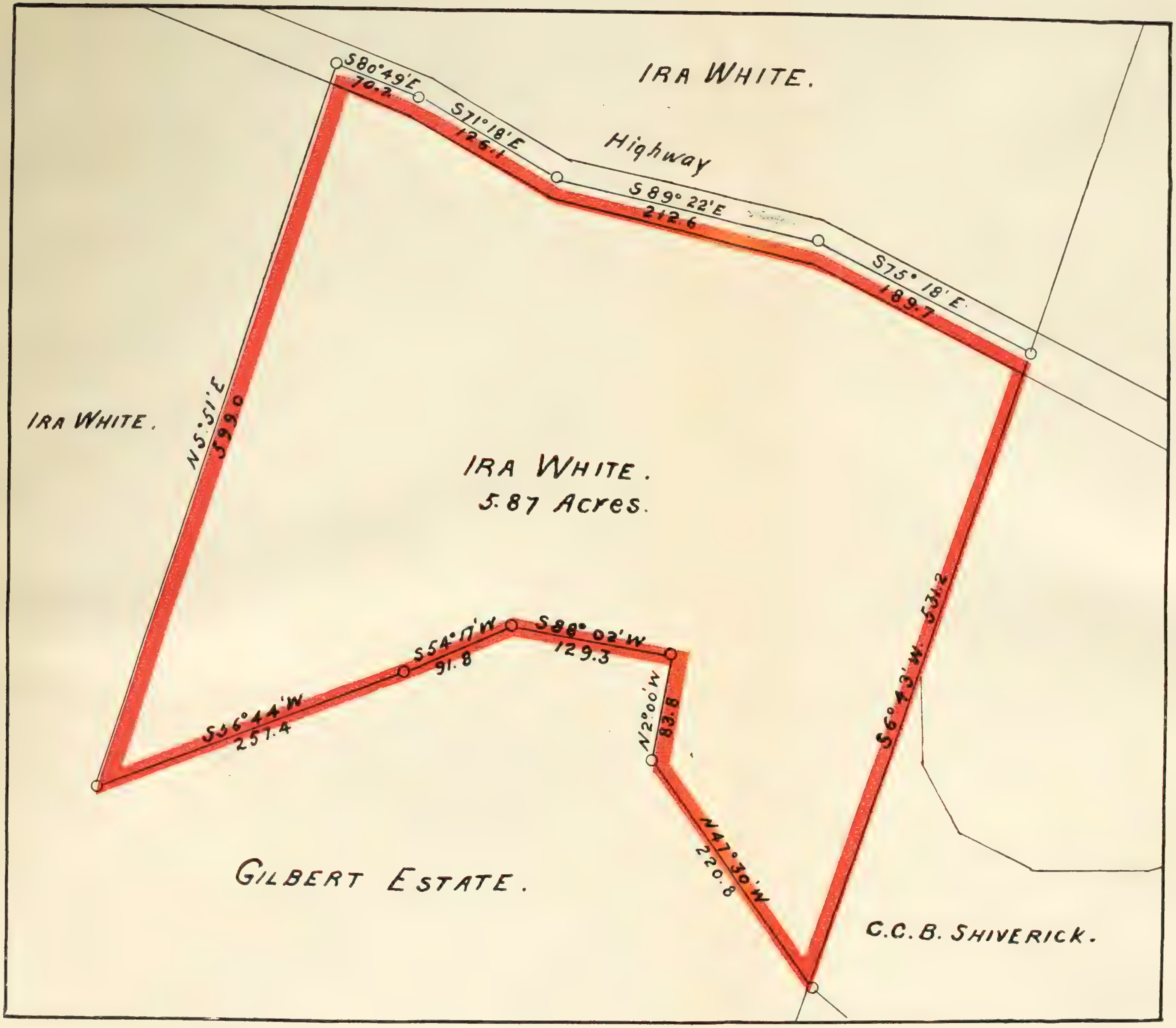
In witness whereof the said party of the first part has hereunto set her hand and seal the day and year first above mentioned.

MARY E. WHITE.

STATE OF NEW YORK, }
COUNTY OF SCHUYLER, } *ss.:*

On this 23rd day of February, in the year one thousand nine hundred, before me personally appeared Mary E. White, to me known to be the same person who executed the foregoing instrument and acknowledged that she executed the same.

WM. D. HURD,
Notary Public.



MAP OF LANDS OF IRA WHITE.
Surveyed Jan. 1900.
Scale, 132' = 1"

[Copy.]

AN AGREEMENT

Made on this 28th day of February, in the year of our Lord one thousand nine hundred, between Margaret Roberts, Watkins, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

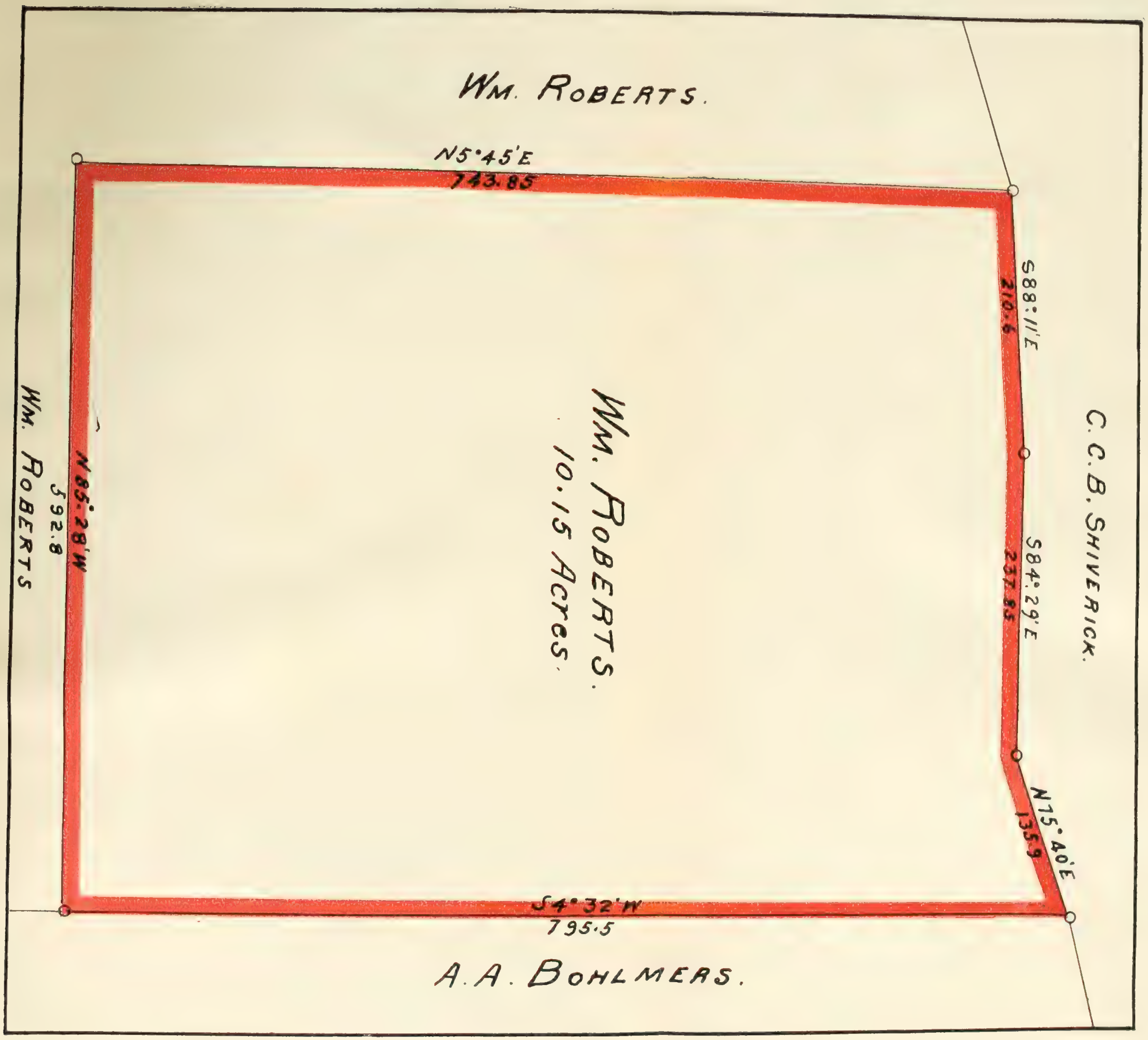
ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at a stake and stones forming the corner of lands now owned by C. C. B. Shiverick, Azubah A. Bohlmers, and the party of the first part; thence S 4° 32′ W 795.5 feet to a stake in the line between the lands of Azubah A. Bohlmers and the party of the first part; thence N 85° 28′ W 592.8 feet to a stake; thence N 5° 45′ E 743.85 feet to a stake; thence S 88° 11′ E 210.6 feet to a stake; thence S 84° 29′ E 237.85 feet to a stake; thence N 75° 40′ E 135.9 feet to the place of beginning and containing about 10.15 acres.

Being located in the northeast corner of lands conveyed by S. B. H. Nichols and wife to Albert Ellis by deed dated April 3d, 1875, and recorded in the office of the clerk of Schuyler county, in Book of Deeds No. 33, page 229, and bounded on the north by lands of C. C. B. Shiverick, on the east by lands of Azubah A. Bohlmers, and on the south and west by lands of the party of the first part; all as shown on attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900.

The hereinbefore mentioned plat of survey made under the direction of the State Engineer and Surveyor is a copy of a portion of the map filed in the office of the Secretary of State of New York, and in the office of the clerk of Schuyler county by the Commissioners of the Watkins Glen Reservation pursuant to chapter 683 of the Laws of 1899.

NOW, THEREFORE, the said party of the first part, in consideration of the sum of one dollar to her in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to her of the sum of $1,015 to be paid as hereinafter



Map of Lands of Wm. Roberts.
Surveyed, Jan. 1900.
Scale, 132'=1".

stated; provided said sum of $1,015 be appropriated by the Legislature of said State for the purpose of paying said party of the first part, for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part of said sum of $1,015 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

In witness whereof the said party of the first part has hereunto set her hand and seal the day and year first above mentioned.

MARGARET ROBERTS.

STATE OF NEW YORK, }
COUNTY OF SCHUYLER, } *ss.:*

On this 28th day of February, in the year one thousand nine hundred, before me personally appeared Margaret Roberts, to me known to be the same person who executed the foregoing instrument and acknowledged that she executed the same.

CHAS. R. WATKINS,
Notary Public.

[Copy.]

AN AGREEMENT

Made this 26th day of February, in the year of our Lord one thousand nine hundred, between Charlotte Roe, of Watkins, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

WHEREAS, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

AND WHEREAS, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at the corner formed by the intersection of the north and west lines of the Corning road (as said road is described in Ordinance No. 42 and on the "Standard map" of the village of Watkins, both of which were adopted January 18, 1875, by the trustees of said village and by said board of trustees directed to be filed in the office of the clerk of Schuyler county), being the northeast corner of lands now owned by the party of the first part; thence S 10° 39′ E 89.6 feet along the west side of the Corning road; thence S 73° 21′ W 145 feet to a red pine tree; thence N 64° 56′ W 76.4 feet to a stake; thence N 10° 15′ E 49 feet to a chestnut tree, on the top of the south bank of the Glen; thence N 79° 52′ E 145.3 feet to a pine stump; thence N 59° 25′ E 46.1 feet to the place of beginning and containing about 0.365 acre.

Being bounded at the north by lands of C. C. Buttner Shiverick, on the east by the Corning road; on the south by Henry H. VanMeter; on the west by Henry H. VanMeter and C. C. B. Shiverick; all as shown on the attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900.

The said plat being a copy of a portion of the map filed in the office of the Secretary of State of New York, and the office of the clerk of Schuyler county, by the Commissioners of the Watkins Glen Reservation pursuant to chapter 638 of the Laws of 1899.

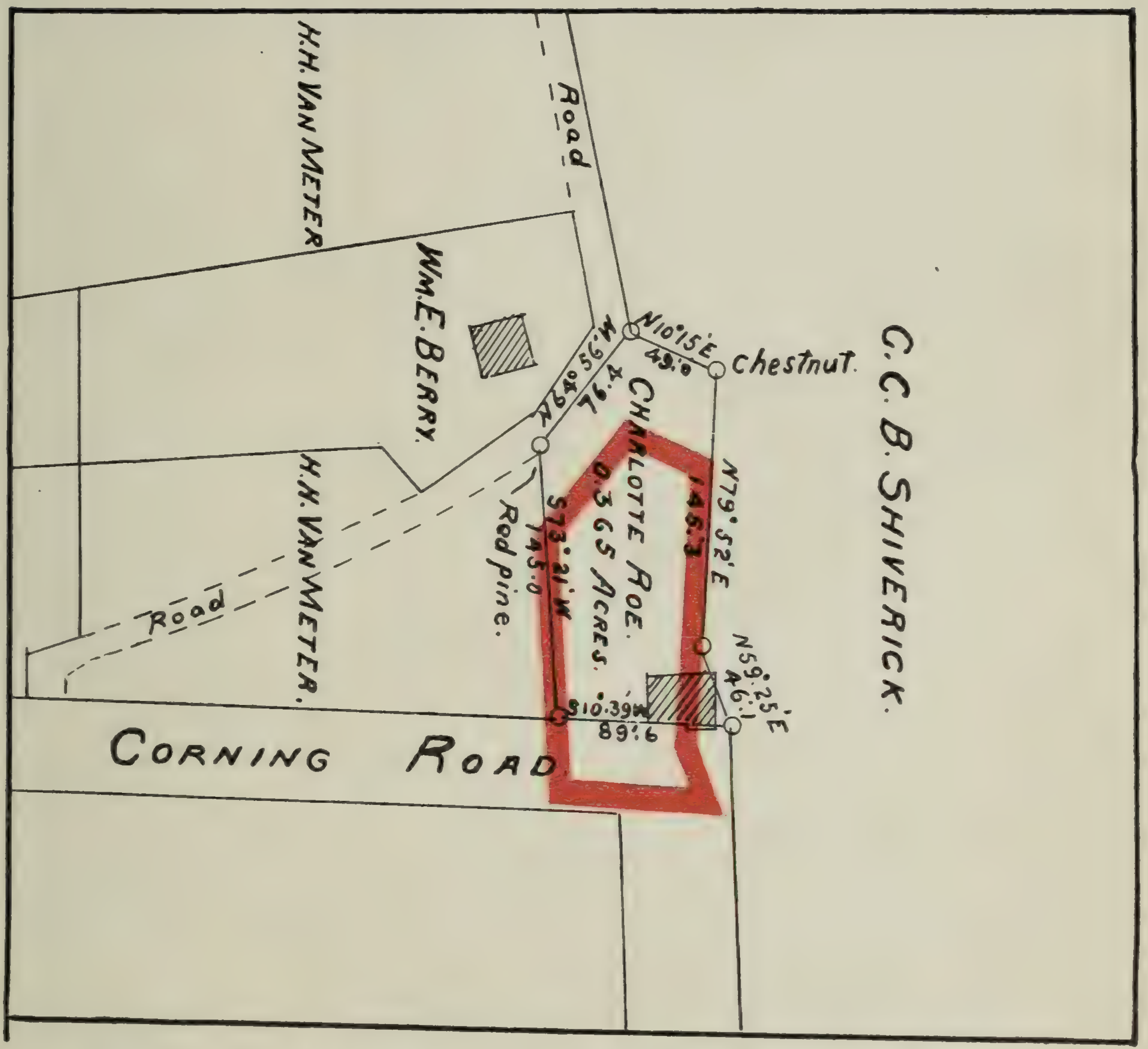
Being the same premises conveyed by deed dated April 14, 1891, by Wm. Pellett and wife to Charlotte Roe, and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 40, page 351.

The party of the first part excepts and reserves the buildings on said premises and agrees to remove the same within one hundred and eighty days from the date of the delivery of the deed of said premises hereinbefore mentioned, and in case of failure to do so within the said time the party of the first part shall forfeit all right to said buildings.

NOW, THEREFORE, the said party of the first part, in consideration of the sum of one dollar to them in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to her of the sum of $800 to be paid as hereinafter stated; provided said sum of $800 be appropriated by the Legislature of said State for the purpose of paying said party of the first part, for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part, of said sum of $800 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said



MAP OF LANDS OF CHARLOTTE ROE.
Surveyed Jan. 1900.
Scale, 132' = 1".

act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

In witness whereof the said party of the first part has hereunto set her hand and seal the day and year first above mentioned.

CHARLOTTE ROE.

STATE OF NEW YORK, } *ss.:*
COUNTY OF SCHUYLER, }

On this 26th day of February, in the year one thousand nine hundred, before me personally appeared Charlotte Roe, to me known to be the same person who executed the foregoing instrument and acknowledged that she executed the same.

JOHN M. ROE,
Notary Public.

[Copy.]

AN AGREEMENT

Made this 23d day of February, in the year of our Lord one thousand nine hundred, between John M. Roe, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at a stake in the west side of the Corning road (as said road is described in Ordinance No. 42, and on the standard map of the village of Watkins, both of which were adopted January 18, 1875, by the trustees of said village and by said board of trustees directed to be filed in the office of the clerk of Schuyler county), being the corner of lands now owned by C. C. B. Shiverick and the party of the first part; thence S 10° 39′ E 70.9 feet along the west side of said Corning road to a stake; thence S 76° 56′ W 192.9 feet to a stake; thence N 21° 34′ W 145 feet to a stake; thence N 75° 42′ E 90 feet; thence S 15° 35′ E 74.6 feet to a stake; thence N 76° 56′ E 124 feet to the place of beginning and containing about 0.471 acre.

Being bounded on the north by lands owned now by Wm. E. Berry and C. C. B. Shiverick; on the east by lands of C. C. B. Shiverick and the Corning road; on the south by lands of the party of the first part; and on the west by lands of Henry H. Van Meter, all as shown on attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900.

The said plat being a copy of a portion of the map filed in the office of the Secretary of State of New York and in the office of the clerk of Schuyler county by the commissioners of the Watkins Glen Reservation pursuant to chapter 683 of the Laws of 1899.

And being the same premises conveyed by deed dated September 4, 1898, by Mary J. Newman and others, to John M. Roe and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 46, page 487, excepting, however, the premises conveyed by deed dated September 17, 1898, by John M. Roe and wife to Caroline C. Buttner and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 46, page 518.

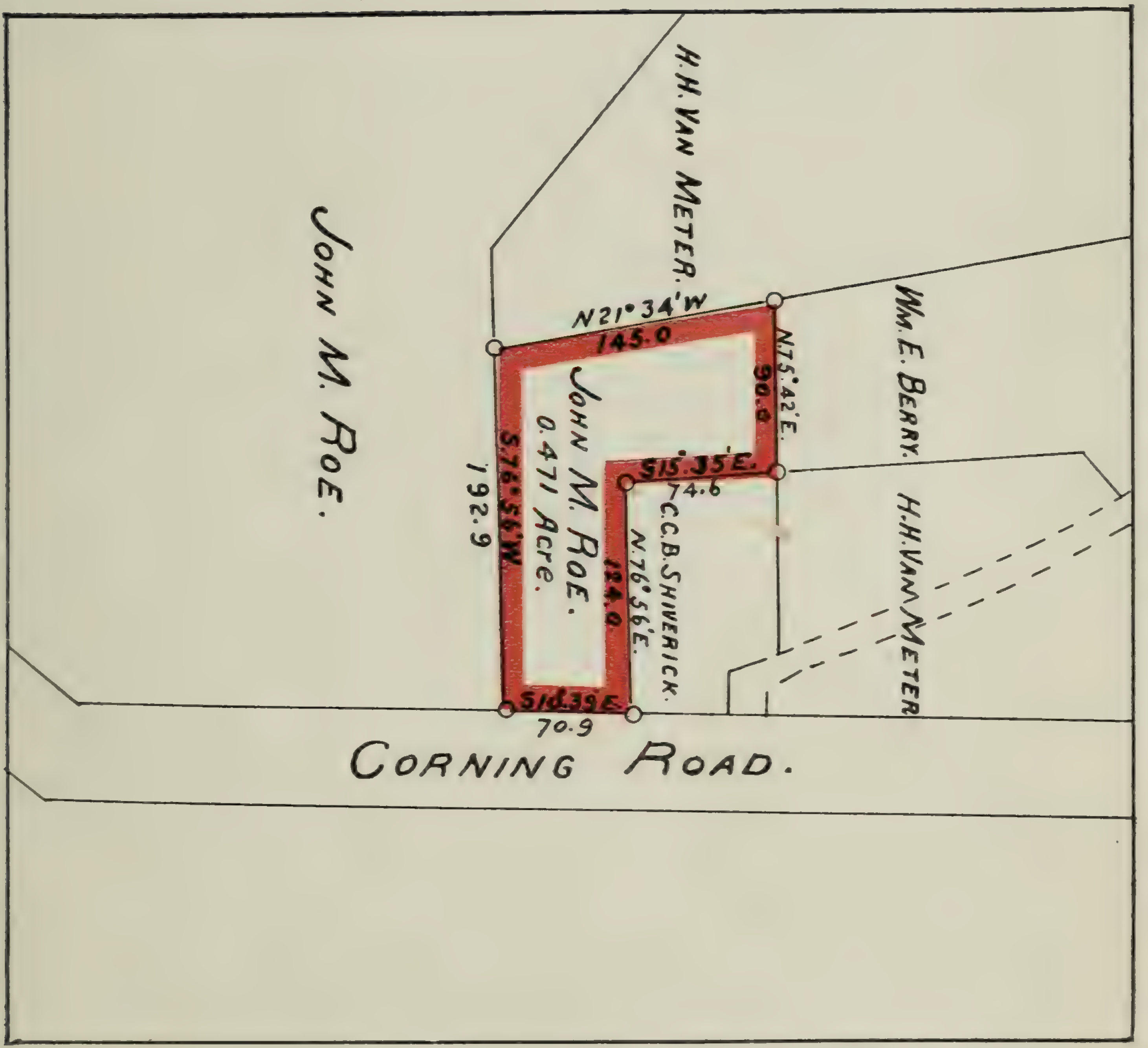
NOW, THEREFORE, the said party of the first part, in consideration of the sum of one dollar to them in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to him of the sum of $100 to be paid as hereinafter stated; provided said sum of $100 be appropriated by the Legislature of said State for the purpose of paying said party of the first part for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part, of said sum of $100 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

In witness whereof the said party of the first part has hereunto set his hand and seal the day and year first above mentioned.

JOHN M. ROE.



MAP OF LANDS OF JOHN M. ROE.
Surveyed Jan. 1900.
Scale, 132'=1"

STATE OF NEW YORK, } *ss.:*
COUNTY OF SCHUYLER, }

On this 23d day of February, in the year one thousand nine hundred, before me personally appeared John M. Roe, to me known to be the same person who executed the foregoing instrument and acknowledged that he executed the same.

WILLIAM H. WAIT,
Notary Public, Schuyler County, N. Y.

[Copy.]

AN AGREEMENT

Made this 28th day of February, in the year of our Lord one thousand nine hundred, between William E. Berry and Minnie Berry, of the town of Dix, in the county of Schuyler and State of New York, party of the first part, and the State of New York, the party of the second part, greeting:

Whereas, by an act of the Legislature of said State, entitled "An act to authorize the selection, location and appropriation of certain lands in the town of Dix, in the county of Schuyler, for a State park or reservation, and to preserve the scenery of what is known as the 'Watkins Glen,' and to make it a place of public resort and pleasure," passed May 25th, 1899, and known as chapter 683 of the Laws of 1899 of the State of New York, the board of commissioners known and designated in said act by the name and style of "The Commissioners of Watkins Glen Reservation," appointed by the Governor of said State, was authorized and empowered to select and locate lands situate in said town of Dix, county of Schuyler, for the purposes specified in said act, and to cause a map of such lands to be made by the State Engineer and Surveyor of said State, and filed in the office of the Secretary of State and in the office of the clerk of the county of Schuyler, and whereas, said board of commissioners has selected, located and determined to take certain lands under the provisions of said act, and has caused a map and survey thereof to be made and filed as in said act directed.

And Whereas, a portion of said lands so selected and located belong to said party of the first part, and which are shown and designated on said map and on the plot attached to this agree-

ment, and are bounded and described as follows, to wit: All that tract or parcel of land situate in said town of Dix, in the county of Schuyler and State of New York.

Beginning at a stake at the northwest corner of lands about to be described; thence N 68° 09′ E 60 feet to a stake; thence S 69° 51′ E 53.2 feet to a stake; thence S 47° 26′ E 73.8 feet to a stake; thence S 37° 52′ W 30 feet to a stake; thence S 15° 35′ E 160.5 feet to a stake; thence S 75° 42′ W 90 feet to a stake; thence N 24° 34′ W 265 feet to the place of beginning and containing about 0.629 acre. Being bounded on the north, east and west by lands of Henry H. VanMeter; and on the south by lands of John M. Roe; all as shown on attached plat of survey made under the direction of the State Engineer and Surveyor during December, 1899, and January, 1900.

The said plat being a copy of a portion of the map filed in the office of the Secretary of the State of New York and in the office of the clerk of Schuyler county by the commissioners of Watkins Glen Reservation pursuant to chapter 683 of the Laws of 1899.

Being the same premises conveyed by deed dated August 10, 1888, by Wm. Newman to Milton L. Berry and recorded in the office of the clerk of Schuyler county in Book of Deeds No. 36, page 496.

Now, Therefore, the said party of the first part, in consideration of the sum of one dollar to them in hand paid by said party of the second part, the receipt of which is hereby acknowledged by said party of the first part, and in further consideration of the payment to them of the sum of $2,000 to be paid as hereinafter stated; provided said sum of $2,000 be appropriated by the Legislature of said State for the purpose of paying said party of the first part for the lands above described at any time within two years from the date of this contract as provided in section five of said act, and said Legislature shall authorize the said board of commissioners to demand a conveyance of the lands above described, hereby covenants and agrees to and with the said party of the second part to sell and convey the above described lands to said party of the second part, by a good and sufficient warranty deed free and clear of all incumbrances upon the receipt from said party of the second part of said sum of $2,000 at any time within two years from the date hereof, if said deed be demanded by said board of commissioners as in said act provided.

It is agreed that the stipulations in this agreement shall bind the heirs, executors and administrators of the said party of the first part.

In case the said Legislature shall not appropriate the moneys for the purchase of said lands within two years provided in said act, and in this contract mentioned, then this agreement shall be null and void and of no force or effect.

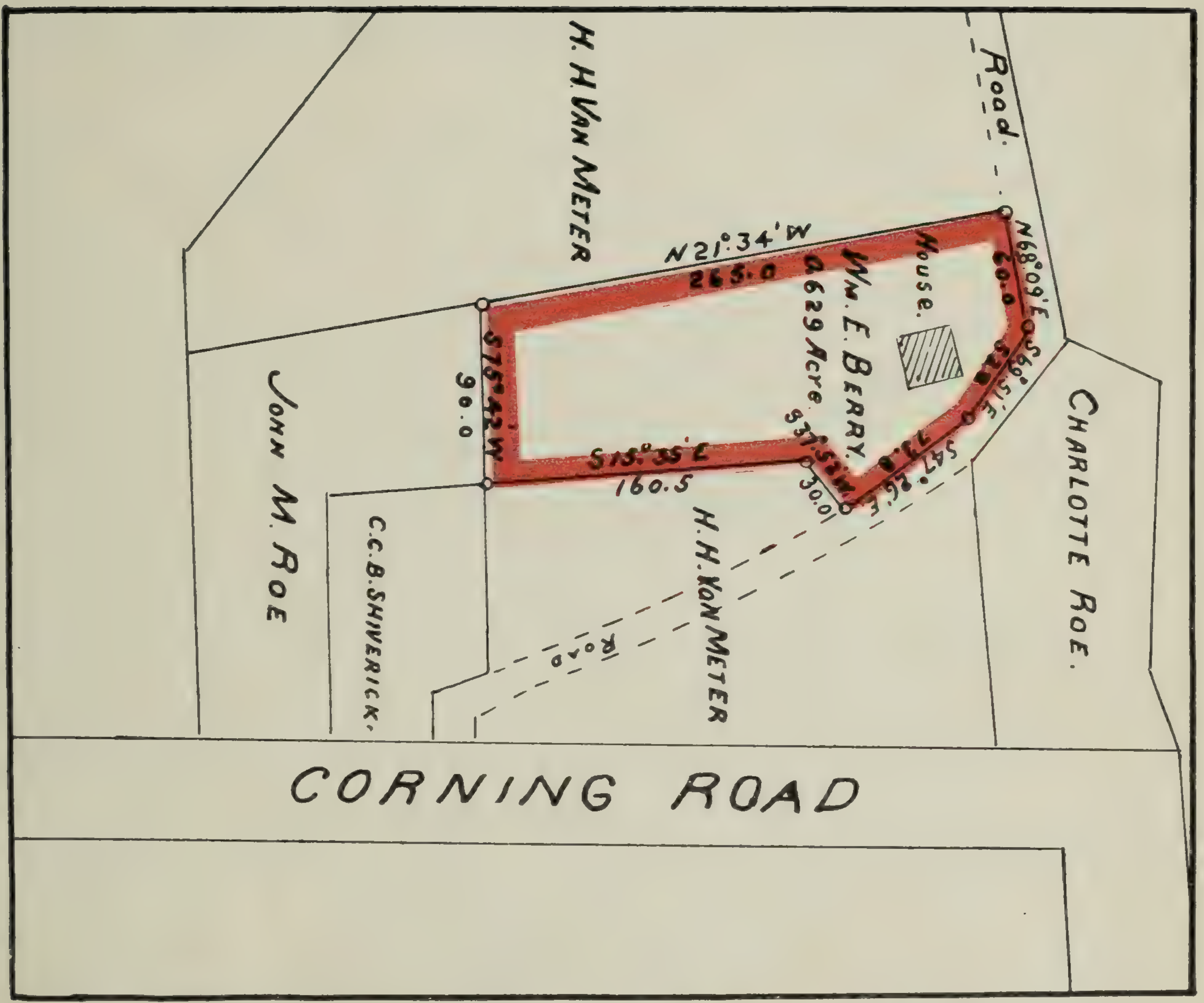
In witness whereof the said party of the first part has hereunto set their hands and seals the day and year first above mentioned.

WILLIAM E. BERRY,
MINNIE BERRY.

STATE OF NEW YORK, } *ss.:*
COUNTY OF SCHUYLER, }

On this 28th day of February, in the year one thousand nine hundred, before me personally appeared William E. Berry and Minnie Berry, to me known to be the same persons who executed the foregoing instrument and acknowledged that they executed the same.

FRANK W. FIERO,
Notary Public.



Map of Lands of Wm. E. Berry.
Surveyed Jan. 1900.
Scale, 132' = 1".

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